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The classification and diversity of extant dragonflies and damselflies (Odonata)

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All relevant data are within the paper.

Abstract. We present an updated classification for extant dragonflies and damselflies (Odonata) and summarize new insights gained over the past two decades. Our focus is on taxa of family-level and higher and we indicate subfamilies only when their monophyly is currently undisputed and well-supported by phylogenetic analyses. The superfamily Calopterygoidea was known to be polyphyletic and based on recent phylogenomic data is divided into nine superfamilies, of which eight are recognized for the first time (Amphipterygoidea **stat. nov.**, Euphaeoidea **stat. nov.**, Megapodagrionoidea **stat. nov.**, Mesopodagrionoidea **stat. nov.**, Philogangoidea **stat. nov.**, Polythoroidea **stat. nov.**, Priscagrionoidea **stat. nov.**, Tatocnemidoidea **stat. nov.**). At present, midway through 2025, odonates are divided into three suborders, 17 superfamilies, 55 families and 687 genera containing 6447 species (May 1, 2025). We give an overview of the distribution of the families across major biogeographical realms. Except for Amanipodagrionidae, nymphs of at least some of the species of all families are known. Our understanding of the classification of dragonflies and damselflies has greatly improved in the past two decades largely due to phylogenetic inferences based on molecular studies. We expect that in the next few years the last remaining issues regarding the

higher-level phylogeny and classification, including the position of the South American genus *Sciotropis* and the division into subfamilies of families such as Coenagrionidae, Aeshnidae, Gomphidae and Libellulidae, will be better refined by the acquisition of additional morphological and genomic data.

Keywords. Biogeography, nomenclature, superfamilies

Amphipterygoidea
urn:lsid:zoobank.org:act:0657A466-39E0-4C34-9A57-98B6421CA37C

Euphaeoidea
urn:lsid:zoobank.org:act:DB2FC7B3-24AE-4941-99B1-B24ECB75EC65

Megapodagrionoidea
urn:lsid:zoobank.org:act:8B731434-A8F2-49E8-9E78-840A4BF4A0B4

Mesopodagrionoidea
urn:lsid:zoobank.org:act:F44AEE7F-0DC4-4179-A48F-667B2BB8FF54

Philogangoidea
urn:lsid:zoobank.org:act:DF9D339A-3714-43BE-B273-027514FAEE1B

Polythoroidea
urn:lsid:zoobank.org:act:868E6753-774C-44B9-A56E-17E3F-F4E15BC

Priscagrionoidea
urn:lsid:zoobank.org:act:4C5F0CB8-4A34-42C6-A1A2-1A74CB3742A6

Tatocnemidoidea
urn:lsid:zoobank.org:act:389591DF-16DB-43EF-8D8B-369AC1777B4C

Introduction

Trueman (2007) summarises 250 years of classification and nomenclature of dragonflies and damselflies and states:

'By the time that Linnaeus is 310 years old, or at most by the time he is 320, I expect the current issues in dragonfly classification and nomenclature will have been resolved.' (Trueman, 2007, page 392)

Linnaeus would be currently 318 years old, and while classification of odonates will be ongoing, we have made significant strides. Since Linnaeus first formally introduced eighteen odonate species in 1758, researchers have worked to describe 6429 additional species, endeavoured to classify them into natural groups, and understand their evolutionary history. A lack of well-defined methods and an overemphasis on wing vein morphology frequently hampered classification efforts, often resulting in arbitrary and intuitive decisions. With the current tools of modern phylogenetic systematics, particularly the dawn of genomic molecular technologies, we now have the tools needed for understanding odonate phylogeny at a level not previously possible. At the time Trueman (2007) published his paper, molecular work on odonates had just started in earnest, but with a relatively small number of genes and taxa by today's standards. His estimate that molecular techniques would help to resolve their classification and nomenclature by the time Linnaeus turned 310 years old (= 2017), although perhaps overly optimistic, did foreshadow enormous growth in our understanding of systematics and classification over the last nearly 20 years.

The current paper provides an updated family level classification of dragonflies and damselflies incorporating the latest insights published by Newton et al. (2026) and Goodman et al. (2026) with notes summarizing key advances made in the past twenty years. Bybee et al. (2021) already established that the then recognised superfamily Calopterygoidea was polyphyletic but it was not until the publication of Newton et al. (2026) that a well-supported phylogeny for the families included in this group became available. The phylogeny in Newton et al. (2026) showed that the superfamily Calopterygoidea in the old sense can no longer be retained. In the current paper, we divide the 26 families previously classified in Calopterygoidea between ten superfamilies, defining each with molecular and/or morphological data.

Methods

We present an updated classification of dragonflies and damselflies based on the most recent phylogenetic insights. For each of the higher-level taxa (family or higher) we give the number of included genera and species and present their distribution across nine biogeographical regions (Abbott et al., 2022; Kalkman et al., 2022; Newton et al., 2026; Olson et al., 2001). As a framework, we use the consensus classification of dragonflies and damselflies presented by Dijkstra et al. (2013, 2014) and updated in Bybee et al. (2021). We update the classification of subfamily level and higher up to January 2026, which includes the changes proposed in Goodman et al. (2026). The data on number of species and genera is based on Paulson et al. (2025; downloaded May 1, 2025). The vast majority of changes taking place in the past twenty years have been within the superfamilies Calopterygoidea and Libelluloidea (Goodman et al., 2026; Newton et al., 2026) and the description or reinstatement of seven families of Zygoptera (Bybee et al., 2021). We indicate subfamilies only when they are well-supported by phylogenetic analyses and currently are undisputed. The subfamily division of Coenagrionidae, Aeshnidae, Gomphidae and Libellulidae is still not satisfactorily resolved and is therefore not included (see Dijkstra, 2025 for an overview of the research studies that have sunk subfamilies in these groups). The notes provide details of key changes to the classification of dragonflies and damselflies since the turn of the century, roughly coinciding with the first applications of molecular studies to odonates. The emphasis in our overview is on papers

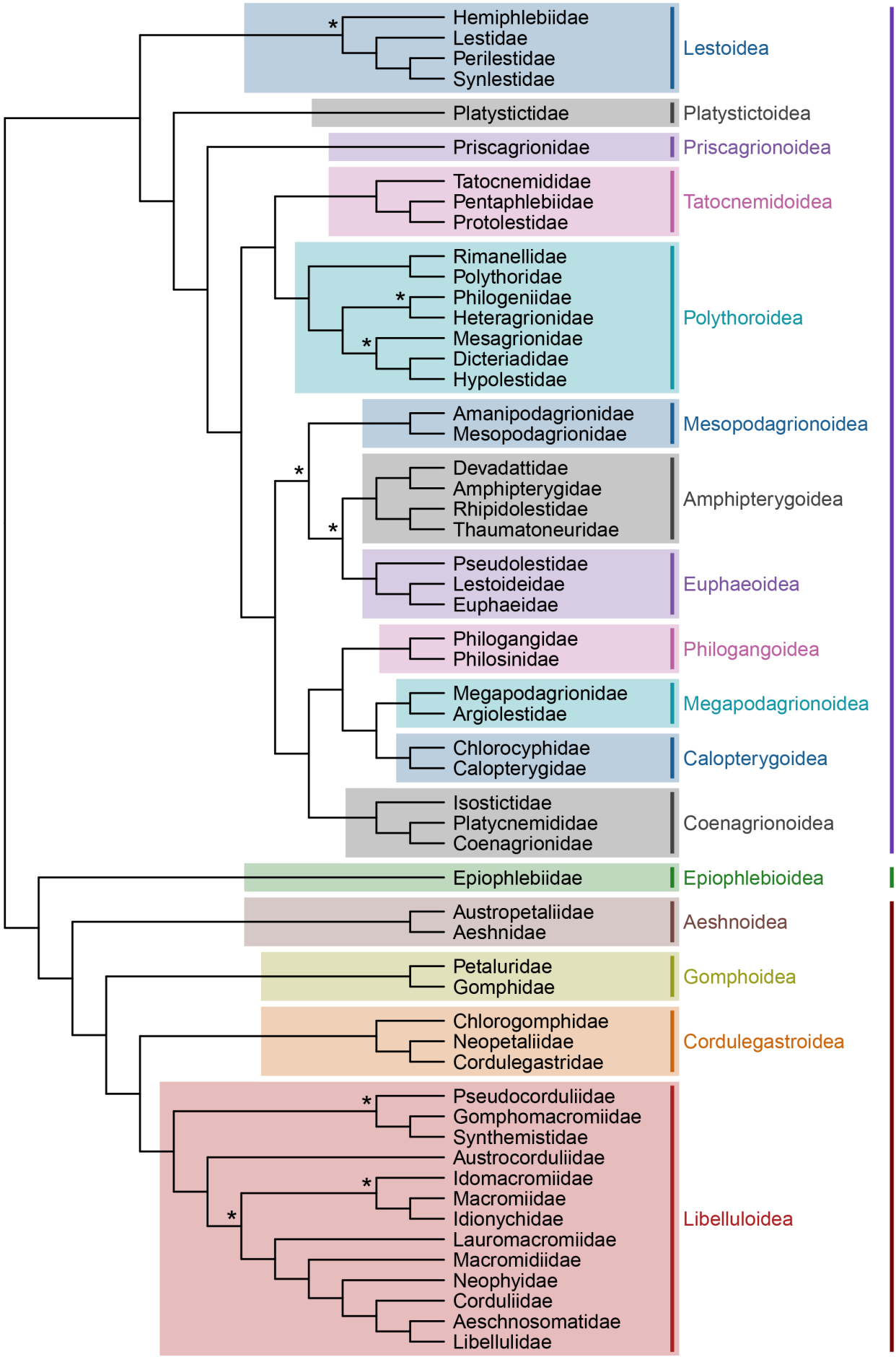

Figure 1. Phylogenetic tree showing the relationships of the families of the order Odonata. Asterisk indicated branches with bootstrap scores below 100 in Newton et al. (2026) for non-Libelluloidea and Goodman et al. (2026) for Libelluloidea.

providing molecular support for the classification and we do not extensively summarize morphological characters of each group, since morphological support often consists of combinations of characters or may be lacking altogether, at least based on previous work. More details on progress made on the study of phylogeny and taxonomy of odonates can be found in Ware et al. (2025b, on dragonflies), Sutherland et al. (2025, on damselflies) and Dijkstra (2025, on all odonates).

The number of species per genus is based on the World Odonata List (Paulson et al., 2025). The presence of species in each of nine biogeographical regions is based on data presented in Newton et al. (2026). The phylogeny presented in Newton et al. (2026) corroborated Calopterygoidea s.l. as paraphyletic. This superfamily in a *sensu stricto* concept is here regarded as being restricted to Calopterygidae and Chlorocyphidae while the other 24 families are divided among nine other superfamilies. Our understanding is that the main purpose of establishing superfamilies is to identify and facilitate communication about monophyletic groups of families. For that reason we opted to split the former Calopterygoidea into those groupings that are most likely to be recognised in further studies. Based on phylogenetic systematic results, it would have been possible to split the Calopterygoidea into a fewer number of superfamilies corresponding to small clades, but it was felt that this would result in biologically meaningless groupings whereas the proposed division groups families with similarities in behaviour and/or morphology, or those restricted to particular biogeographical regions. We refrain from providing morphological diagnoses for the new superfamilies as in most cases no clear apomorphies are known.

Results

Figure 1 and Table 1 present an up-to-date classification of dragonflies and damselflies. These include eight new statuses of family group names raised for the first time to superfamily level proposed here (Amphipterygoidea **stat. nov.**, Euphaeoidea **stat. nov.**, Megapodagrionoidea **stat. nov.**, Mesopodagrionoidea **stat. nov.**, Philogangoidea **stat. nov.**, Polythoroidea **stat. nov.**, Priscagrionoidea **stat. nov.**, Tatocnemidoidea **stat. nov.**). The classification scheme hypothesized consists of three suborders, 17 superfamilies, 55 families and 687 genera. Table 2 provides information on the distribution of the different families across nine biogeographical regions.

Table 1. Classification of dragonflies and damselflies.

ORDER ODONATA FABRICIUS, 1793 (3 suborders, 17 superfamilies, 55 families, 687 genera, 6447 species)

SUBORDER ZYGOPTERA SELYS, 1854 (12 superfamilies, 34 families, 318 genera, 3332 species) [**Note 01**]

Superfamily Lestoidea Calvert, 1901 (4 families, 21 genera, 201 species)
Family Hemiphlebiidae Kennedy, 1920 (1 genus, 1 species)
Genera: *Hemiphlebia* Selys, 1868 (1 species).
Family Perilestidae Kennedy, 1920 (2 genera, 21 species) [**Note 02**]
Genera: *Perilestes* Hagen in Selys, 1862 (9 species); *Perissolestes* Kennedy, 1941 (12 species).
Family Synlestidae Tillyard, 1917 (9 genera, 31 species) [**Note 02**]
Genera: *Chlorolestes* Selys, 1862 (7 species); *Chorismagrion* Morton, 1914 (1 species); *Ecchlorolestes* Barnard, 1937 (2 species); *Episynlestes* Kennedy, 1920 (3 species); *Megalestes* Selys, 1862 (12 species); *Nubiolestes* Fraser, 1945 (1 species); *Phylolestes* Christiansen, 1947 (1 species); *Sinolestes* Needham, 1930 (1 species); *Synlestes* Selys, 1868 (3 species).
Family Lestidae Calvert, 1901 (9 genera, 148 species) [**Note 03**]
Genera: *Archilestes* Selys, 1862 (9 species); *Austrolestes* Tillyard, 1913 (10 species); *Chalcolestes* Kennedy, 1920 (2 species); *Indolestes* Fraser, 1922 (35 species); *Lestes* Leach, 1815 (80 species); *Orolestes* McLachlan, 1895 (4 species); *Platylestes* Selys, 1862 (4 species); *Sinhalestes* Fraser, 1951 (1 species); *Sympecma* Burmeister, 1839 (3 species).

Superfamily Platystictoidea Kennedy, 1920 (1 family, 10 genera, 284 species)
Family Platystictidae Kennedy, 1920 (10 genera, 284 species) [**Note 04**]
Subfamily Sinostictinae Wilson 1997 (2 genera, 7 species)
Genera: *Sinosticta* Wilson, 1997 (4 species); *Yunnanosticta* Dow & Zhang, 2018 (3 species).
Subfamily Platystictinae Kennedy, 1920 (2 genera, 26 species)
Genera: *Ceylonosticta* Fraser, 1931 (22 species); *Platysticta* Selys, 1860 (4 species).
Subfamily Palaemnematinae Tillyard & Fraser, 1938 (1 genera, 43 species)
Genera: *Palaemnema* Selys, 1860 (43 species).
Subfamily Protostictinae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014 (5 genera, 208 species)
Genera: *Drepanosticta* Laidlaw, 1917 (127 species); *Indosticta* Bedjanič, 2016 (1 species); *Protosticta* Selys, 1885 (58 species); *Sulcosticta* van Tol, 2005 (5 species); *Telosticta* Dow & Orr, 2012 (17 species).

Superfamily Priscagrionoidea Kalkman & Bybee 2021 (1 family, 2 genera, 5 species) [**Note 05**]
Family Priscagrionidae Kalkman & Bybee 2021 (2 genera, 5 species)
Genera: *Priscagrion* Zhou & Wilson, 2001 (2 species); *Sinocnemis* Wilson & Zhou, 2000 (3 species).

Superfamily Tatocnemidoidea Racenis 1959 (3 families, 3 genera, 21 species) [**Note 06**]
Family Protolestidae Dijkstra & Bybee 2021 (1 genus, 8 species)
Genera: *Protolestes* Förster, 1899 (8 species).
Family Tatocnemididae Racenis 1959 (1 genus, 10 species)
Genera: *Tatocnemis* Kirby, 1889 (10 species).
Family Pentaphlebiidae Novelo-Gutiérrez, 1995 (1 genus, 3 species)
Genera: *Pentaphlebia* Förster, 1909 (3 species).

Superfamily Polythoroidea Munz, 1919 (7 families, 18 genera, 192 species) [**Note 07**]
Family Dicteriadidae Montgomery, 1959 (2 genera, 2 species)
Genera: *Dicterias* Selys, 1853 (1 species); *Heliocharis* Selys, 1853 (1 species).
Family Mesagrionidae Kalkman & Sanchez-Herrera 2021 (1 genus, 1 species)
Genera: *Mesagrion* Selys, 1885 (1 species).
Family Hypolestidae Fraser, 1938 (1 genus, 3 species)
Genera: *Hypolestes* Gundlach, 1888 (3 species).
Family Heteragrionidae Rácenis, 1959 (4 genera, 76 species)
Genera: *Dimeragrion* Calvert, 1913 (6 species); *Heteragrion* Selys, 1862 (62 species); *Heteropodagrion* Selys, 1885 (5 species); *Oxystigma* Selys, 1862 (3 species).
Family Philogeniidae Rácenis, 1959 (2 genera, 46 species)
Genera: *Archaeopodagrion* Kennedy, 1939 (7 species); *Philogenia* Selys, 1862 (39 species).
Family Polythoridae Munz, 1919 (7 genera, 63 species)
Genera: *Chalcopteryx* Selys, 1853 (5 species); *Chalcothore* De Marmels, 1988 (1 species); *Cora* Selys, 1853 (9 species); *Euthore* Selys, 1869 (14 species); *Miocora* Calvert, 1917 (10 species); *Polythore* Calvert, 1917 (23 species); *Stenocora* Kennedy, 1940 (1 species).
Family Rimanellidae Davies & Tobin, 1984 (1 genus, 1 species)
Genera: *Rimanella* Needham, 1934 (1 species).

Superfamily Mesopodagrionoidea Kalkman & Abbott 2021 (2 families, 2 genera, 3 species) [**Note 08**]
Family Amanipodagrionidae Dijkstra & Ware 2021 (1 genus, 1 species)
Genera: *Amanipodagrion* Pinhey, 1962 (1 species).
Family Mesopodagrionidae Kalkman & Abbott 2021 (1 genus, 2 species)
Genera: *Mesopodagrion* McLachlan, 1896 (2 species).

Superfamily Amphipterygoidea Tillyard, 1917 (4 families, 8 genera, 65 species) [**Note 09**]
Family Amphipterygidae Tillyard, 1917 (1 genus, 5 species)
Genera: *Amphipteryx* Selys, 1853 (5 species)
Family Devadattidae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014 (1 genus, 14 species)
Genera: *Devadatta* Kirby, 1890 (14 species)
Family Rhipidolestidae Silsby, 2001 (4 genera, 30 species)
Genera: *Agriomorpha* May, 1933 (2 species); *Bornargiolestes* Kimmins, 1936 (3 species); *Burmargiolestes* Kennedy, 1925 (2 species); *Rhipidolestes* Ris, 1912 (23 species).
Family Thaumatoneuridae Fraser, 1957 (2 genera, 16 species)
Genera: *Paraphlebia* Selys in Hagen, 1861 (15 species); *Thaumatoneura* McLachlan, 1897 (1 species).

Superfamily Euphaeoidea Jakobson & Bianchi, 1905 (3 families, 12 genera, 90 species) [**Note 10**]
Family Euphaeidae Jakobson & Bianchi, 1905 (9 genera, 80 species)
Genera: *Anisopleura* Selys, 1853 (11 species); *Bayadera* Selys, 1853 (17 species); *Cryptophaea* Hämäläinen, 2003 (3 species); *Cyclophaea* Ris, 1930 (1 species); *Dysphaea* Selys, 1853 (9 species); *Epallage* Charpentier, 1840 (1 species); *Euphaea* Selys, 1840 (36 species); *Heterophaea* Cowley, 1934 (1 species); *Schmidtiphaea* Asahina, 1978 (1 species).
Family Lestoideidae Munz, 1919 (2 genera, 9 species)
Subfamily Diphlebiinae Heymer, 1975 (1 genus, 5 species)
Genera: *Diphlebia* Selys, 1869 (5 species).
Subfamily Lestoideinae Munz, 1919 (1 genus, 4 species)
Genera: *Lestoidea* Tillyard, 1913 (4 species).
Family Pseudolestidae Fraser, 1957 (1 genus, 1 species)
Genera: *Pseudolestes* Kirby, 1900 (1 species)

Superfamily Philogangoidea Kennedy, 1920 (2 families, 3 genera, 17 species) [**Note 11**]
Family Philogangidae Kennedy, 1920 (1 genus, 4 species)
Genera: *Philoganga* Kirby, 1890 (4 species).
Family Philosinidae Kennedy, 1925 (2 genera, 13 species)
Genera: *Philosina* Ris, 1917 (3 species); *Rhinagrion* Calvert, 1913 (10 species).

Superfamily Megapodagrionoidea Tillyard, 1917 (2 families, 23 genera, 156 species) [**Note 12**]

Family Megapodagrionidae Tillyard, 1917 (3 genera, 29 species) [**Note 13**]

Genera: *Allopodagrion* Förster, 1910 (3 species); *Megapodagrion* Selys, 1885 (1 species); *Teinopodagrion* De Marmels, 2001 (25 species).

Family Argiolestidae Fraser, 1960 (20 genera, 127 species) [**Note 14**]

Subfamily Argiolestinae Fraser, 1960 (16 genera, 99 species)

Genera: *Archiargiolestes* Kennedy, 1925 (3 species); *Argiolestes* Selys, 1862 (14 species); *Austroargiolestes* Kennedy, 1925 (10 species); *Caledargiolestes* Kennedy, 1925 (2 species); *Caledopteryx* Kennedy, 1925 (2 species); *Celebargiolestes* Kennedy, 1925 (4 species); *Eoargiolestes* Kalkman & Theischinger, 2013 (1 species); *Griseargiolestes* Theischinger, 1998 (7 species); *Luzonargiolestes* Kalkman & Theischinger, 2013 (2 species); *Metagrion* Calvert, 1913 (23 species); *Miniargiolestes* Theischinger, 1998 (1 species); *Podopteryx* Selys, 1871 (3 species); *Pyrrhargiolestes* Kalkman & Theischinger, 2013 (7 species); *Solomonargiolestes* Kalkman & Theischinger, 2013 (2 species); *Trineuragrion* Ris, 1915 (1 species); *Wahnesia* Förster, 1900 (17 species).

Subfamily Podolestinae Kalkman & Theischinger 2013 (4 genera, 28 species)

Genera: *Allolestes* Selys, 1869 (1 species); *Nesolestes* Selys, 1891 (16 species); *Neurolestes* Selys, 1882 (2 species); *Podolestes* Selys, 1862 (9 species).

Superfamily Calopterygoidea Selys, 1850 (2 families, 40 genera, 345 species) [**Note 15**]

Family Calopterygidae Selys, 1850 (21 genera, 183 species) [**Note 16**]

Subfamily Calopteryginae Selys, 1850 (17 genera, 118 species)

Genera: *Archineura* Kirby, 1894 (3 species); *Atrocalopteryx* Dumont, Vanfleteren, De Jonckheere & Weekers, 2005 (8 species); *Caliphaea* Hagen in Selys, 1859 (6 species); *Calopteryx* Leach, 1815 (16 species); *Echo* Selys, 1853 (5 species); *Iridictyon* Needham & Fisher, 1940 (2 species); *Matrona* Selys, 1853 (9 species); *Matronoides* Förster, 1897 (1 species); *Mnais* Selys, 1853 (9 species); *Neurobasis* Selys, 1853 (13 species); *Noguchiphaea* Asahina, 1976 (3 species); *Phaon* Selys, 1853 (3 species); *Psolodesmus* McLachlan, 1870 (2 species); *Sapho* Selys, 1853 (7 species); *Umma* Kirby, 1890 (10 species); *Vestalaria* May, 1935 (5 species); *Vestalis* Selys, 1853 (16 species).

Subfamily Hetaerininae Tillyard & Fraser, 1939 (4 genera, 65 species)

Genera: *Bryoplathanon* Garrison, 2006 (1 species); *Hetaerina* Hagen in Selys, 1853 (37 species); *Mnesarete* Cowley, 1934 (23 species); *Ormenophlebia* Garrison, 2006 (4 species).

Family Chlorocyphidae Cowley, 1937 (19 genera, 162 species) **[Note 17]**

Genera: *Africocypha* Pinhey, 1961 (3 species); *Aristocypha* Laidlaw, 1950 (12 species); *Calocypha* Fraser, 1928 (1 species); *Chlorocypha* Fraser, 1928 (28 species); *Cyrano* Needham & Gyger, 1939 (2 species); *Disparocypha* Ris, 1916 (1 species); *Heliocypha* Fraser, 1949 (9 species); *Heterocypha* Laidlaw, 1950 (1 species); *Indocypha* Fraser, 1949 (7 species); *Libellago* Selys, 1840 (25 species); *Melanocypha* Fraser, 1949 (1 species); *Pachycypha* Lieftinck, 1950 (1 species); *Platycypha* Fraser, 1949 (14 species); *Rhinocypha* Rambur, 1842 (46 species); *Rhinoneura* Laidlaw, 1915 (2 species); *Sclerocypha* Fraser, 1949 (1 species); *Stenocypha* Dijkstra, 2013 (5 species); *Sundacypha* Laidlaw, 1950 (2 species); *Watuwila* van Tol, 1998 (1 species).

Superfamily Coenagrionoidea Kirby, 1890 (3 families, 175 genera, 1951 species)

Family Isostictidae Fraser, 1955 (12 genera, 46 species)

Genera: *Austrosticta* Tillyard, 1908 (3 species); *Cnemisticta* Donnelly, 1993 (2 species); *Eurysticta* Watson, 1969 (4 species); *Isosticta* Selys, 1885 (5 species); *Labidiosticta* Watson, 1991 (1 species); *Lithosticta* Watson, 1991 (1 species); *Neosticta* Tillyard, 1913 (3 species); *Oristicta* Tillyard, 1913 (2 species); *Rhadinosticta* Watson, 1991 (2 species); *Selysioneura* Förster, 1900 (16 species); *Tanymecosticta* Lieftinck, 1935 (6 species); *Titanosticta* Donnelly, 1993 (1 species).

Family Platycnemididae Jakobson & Bianchi, 1905 (42 genera, 485 species) [**Note 18**]

Subfamily Allocnemidinae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014 (5 genera, 26 species)

Genera: *Allocnemis* Selys, 1863 (18 species); *Arabicnemis* Waterston, 1984 (1 species); *Mesocnemis* Karsch, 1891 (5 species); *Metacnemis* Hagen in Selys, 1863 (1 species); *Stenocnemis* Karsch, 1899 (1 species).

Subfamily Calicnemiinae Fraser, 1957 (4 genera, 108 species)

Genera: *Asthenocnemis* Lieftinck, 1949 (2 species); *Calicnemia* Strand, 1928 (23 species); *Coeliccia* Kirby, 1890 (80 species); *Indocnemis* Laidlaw, 1917 (3 species).

Subfamily Disparoneurinae Fraser, 1957 (9 genera, 187 species)

Genera: *Arabineura* Schneider & Dumont, 1995 (1 species); *Caconeura* Kirby, 1890 (5 species); *Disparoneura* Selys, 1860 (2 species); *Elattoneura* Cowley, 1935 (45 species); *Esme* Fraser, 1922 (3 species); *Melanoneura* Fraser, 1922 (2 species); *Nosticta* Hagen in Selys, 1860 (89 species); *Phylloneura* Fraser, 1922 (2 species); *Prodasineura* Cowley, 1934 (38 species).

Subfamily Idiocnemidinae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014 (16 genera, 121 species)

Genera: *Archboldargia* Lieftinck, 1949 (3 species); *Arrhenocnemis* Lieftinck, 1933 (3 species); *Cyanocnemis* Lieftinck, 1949 (1 species); *Hylaeargia* Lieftinck, 1949 (5 species); *Idiocnemis* Selys, 1878 (23 species); *Igneocnemis* Hämäläinen, 1991 (20 species); *Lieftinckia* Kimmins, 1957 (7 species); *Lochmaeocnemis* Lieftinck, 1949 (1 species); *Macrocnemis* Theischinger, Gassmann & Richards, 2015 (1 species); *Palaiargia* Förster, 1903 (26 species); *Papuargia* Lieftinck, 1938 (2 species); *Paramecocnemis* Lieftinck, 1932 (5 species); *Rhyacocnemis* Lieftinck, 1956 (4 species); *Risiocnemis* Cowley, 1934 (18 species); *Salomocnemis* Lieftinck, 1987 (1 species); *Torrenticnemis* Lieftinck, 1949 (1 species).

Subfamily Onychargiinae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014 (2 genera, 4 species)

Genera: *Onychargia* Selys, 1865 (2 species); *Paracnemis* Martin, 1902 (2 species).

Subfamily Platycnemidinae Jakobson & Bianchi, 1905 (6 genera, 39 species)
Genera: *Copera* Kirby, 1890 (9 species); *Matticnemis* Dijkstra, 2013 (1 species); *Platycnemis* Burmeister, 1839 (12 species); *Proplatycnemis* Kennedy, 1920 (12 species); *Pseudocopera* Fraser, 1922 (4 species); *Spesbona* Dijkstra, 2013 (1 species).

Family Coenagrionidae Kirby, 1890 (121 genera, 1420 species) (**Note 19**)
Genera: *Acanthagrion* Selys, 1876 (42 species); *Acanthallagma* Williamson & Williamson, 1924 (3 species); *Aceratobasis* Kennedy, 1920 (4 species); *Aciagrion* Selys, 1891 (28 species); *Aeolagrion* Williamson, 1917 (4 species); *Africallagma* Kennedy, 1920 (12 species); *Agriocnemis* Selys, 1877 (43 species); *Amazoneura* Machado, 2004 (3 species); *Amorphostigma* Fraser, 1925 (3 species); *Amphiagrion* Selys, 1876 (2 species); *Amphiallagma* Kennedy, 1920 (1 species); *Amphicnemis* Selys, 1863 (22 species); *Andinagrion* Bulla, 1973 (3 species); *Angelagrion* Lencioni, 2008 (2 species); *Anisagrion* Selys, 1876 (4 species); *Anomisma* McLachlan, 1877 (1 species); *Antiagrion* Ris, 1904 (4 species); *Apanisagrion* Kennedy, 1920 (1 species); *Archibasis* Kirby, 1890 (9 species); *Argentagrion* Fraser, 1948 (2 species); *Argia* Rambur, 1842 (145 species); *Argiocnemis* Selys, 1877 (3 species); *Austroagrion* Tillyard, 1913 (5 species); *Austroallagma* Lieftinck, 1953 (1 species); *Austrocnemis* Tillyard, 1913 (3 species); *Austrocoenagrion* Kennedy, 1920 (1 species); *Azuragrion* May, 2002 (6 species); *Bromeliagrion* De Marmels in De Marmels & Garrison, 2005 (3 species); *Caliagrion* Tillyard, 1913 (1 species); *Calvertagrion* St. Quentin, 1960 (5 species); *Ceriagrion* Selys, 1876 (50 species); *Chromagrion* Needham, 1903 (1 species); *Coenagriocnemis* Fraser, 1949 (4 species); *Coenagrion* Kirby, 1890 (28 species); *Coryphagrion* Morton, 1924 (1 species); *Cyanallagma* Kennedy, 1920 (8 species); *Dactylobasis* Pérez-Gutiérrez, 2019 (1 species); *Denticulobasis* Machado, 2009 (3 species); *Diceratobasis* Kennedy, 1920 (2 species); *Dolonagrion* Garrison & von Ellenrieder, 2008 (1 species); *Drepanoneura* von Ellenrieder & Garrison, 2008 (8 species); *Enacantha* Donnelly & Alayo, 1966 (1 species); *Enallagma* Charpentier, 1840 (44 species); *Epipleoneura* Williamson, 1915 (30 species); *Epipotoneura* Williamson, 1915 (2 species); *Erythromma* Charpentier, 1840 (3 species); *Fluminagrion* Anjos-Santos, Lozano & Costa, 2013 (1 species); *Forcepsioneura* Lencioni, 1999 (13 species); *Franciscagrion* Machado & Bedê, 2016 (2 species); *Franciscobasis* Machado & Bedê, 2016 (1 species); *Hesperagrion* Calvert, 1902 (1 species); *Hivaagrion* Hämäläinen & Marinov, 2014 (2 species); *Homeoura* Kennedy, 1920 (4 species); *Huosoma* Guan, Dumont, Yu, Han & Vierstraete, 2013 (2 species); *Hylaeonympha* Rácenis, 1968 (1 species); *Idioneura* Selys, 1860 (3 species); *Inpabasis* Santos, 1961 (5 species); *Ischnura* Charpentier, 1840 (71 species); *Junix* Rácenis, 1968 (1 species); *Lamproneura* De Marmels, 2003 (1 species); *Leptagrion* Selys, 1876 (20 species); *Leptobasis* Selys, 1877 (9 species); *Leptocnemis* Selys, 1886 (1 species); *Leucobasis* Rácenis, 1959 (1 species); *Luzonobasis* Villanueva, 2012 (1 species); *Mecistogaster* Rambur, 1842 (9 species); *Megalagrion* McLachlan, 1883 (23 species); *Megaloprepus* Rambur, 1842 (4 species); *Melanesobasis* Donnelly, 1984 (7 species); *Mesamphiagrion* Kennedy, 1920 (14 species); *Mesoleptobasis* Sjöstedt, 1918 (5 species); *Metaleptobasis* Calvert, 1907 (32 species); *Microstigma* Rambur, 1842 (3 species); *Minagrion* Santos, 1965 (6 species); *Mortonagrion* Fraser, 1920 (16 species); *Negragrion* Muzón & Lozano, 2020 (1 species); *Nehalennia* Selys, 1850 (6 species); *Neoerythromma* Kennedy, 1920 (2 species); *Neoneura* Selys, 1860 (29 species); *Nesobasis* Selys, 1891 (28 species); *Nikoulabasis* Ferguson, Marinov, Saxton, Rashni & Bybee, 2023 (11 species); *Oreiallagma* von Ellenrieder & Garrison, 2008 (5 species); *Oreocnemis* Pinhey, 1971 (1 species); *Oxyagrion* Selys, 1876 (26 species); *Oxyallagma* Kennedy, 1920 (2 species); *Pacificagrion* Fraser, 1926 (2 species); *Pandanobasis* Villanueva, 2012 (4 species); *Papuagrion* Ris, 1913 (29 species); *Paracercion* Weekers & Dumont, 2004 (9 species); *Pericnemis* Selys, 1863 (13 species); *Peristicta* Hagen in Selys, 1860 (8 species); *Phasmoneura* Williamson, 1916 (2 species); *Phoenicagrion* von Ellenrieder, 2008 (7 species); *Pinheyagrion* May, 2002 (1 species); *Plagulibasis* Lieftinck, 1949 (2 species); *Platystigma* Kennedy, 1920 (8 species); *Proischnura* Kennedy, 1920 (3 species); *Proneura* Selys, 1889 (1 species); *Protallagma* Kennedy, 1920 (2 species); *Protoneura* Selys in Sagra, 1857 (22 species); *Psaironeura* Williamson, 1915 (6 species); *Pseudagrion* Selys, 1876 (165 species); *Pseudostigma* Selys, 1860 (2 species); *Pyrrhosoma* Charpentier, 1840 (2 species); *Roppaneura* Santos, 1966 (1 species); *Sangabasis* Villanueva, 2012 (12 species); *Schistolobos* von Ellenrieder & Garrison, 2008 (1 species); *Stenagrion* Laidlaw, 1915 (2 species); *Teinobasis* Kirby, 1890 (88 species); *Telagrion* Selys, 1876 (1 species); *Telebasis* Selys, 1865 (62 species); *Tepuibasis* De Marmels, 2007 (9 species); *Thaumatagrion* Lieftinck, 1932 (1 species); *Tigriagrion* Calvert, 1909 (1 species); *Tuberculobasis* Machado, 2009 (13 species); *Tukanobasis* Machado, 2009 (2 species); *Vanuatubasis* Ober & Staniczek, 2009 (10 species); *Xanthagrion* Selys, 1876 (1 species); *Xanthocnemis* Tillyard, 1913 (2 species); *Xiphiagrion* Selys, 1876 (2 species); *Zoniagrion* Kennedy, 1917 (1 species).

Superfamily - Incertae sedis
Genera: *Sciotropis* Rácenis, 1959 (2 species) [**Note 20**]

SUBORDER ANISOZYGOPTERA HANDLIRSCH, 1906 (1 superfamily, 1 family, 1 genus, 3 species)

Superfamily Epiophlebioidea Muttkowski, 1910 (1 family, 1 genus, 3 species) [**Note 21**]
Family Epiophlebiidae Muttkowski, 1910 1 genus, 3 species)
Genera: *Epiophlebia* Calvert, 1903 (3 species)

SUBORDER ANISOPTERA SELYS, 1854 (4 superfamilies, 20 families, 368 genera, 3112 species)

Superfamily Aeshnoidea Leach, 1815 (2 families, 58 genera, 510 species) [**Note 22**]
Family Austropetaliidae Carle & Louton, 1994 (4 genera, 11 species)
Genera: *Archipetalia* Tillyard, 1917 (1 species); *Austropetalia* Tillyard, 1916 (3 species); *Hypopetalia* McLachlan, 1870 (1 species); *Phyllopetalia* Selys, 1858 (6 species).

Family Aeshnidae Leach, 1815 (54 genera, 499 species) [**Note 23**]
Genera: *Acanthaeschna* Selys, 1883 (1 species); *Adversaeschna* Watson, 1992 (1 species); *Aeschnophlebia* Selys, 1883 (32 species); *Aeshna* Fabricius, 1775 (31 species); *Afroaeschna* Peters & Theischinger, 2011 (1 species); *Agyrtacantha* Lieftinck, 1937 (6 species); *Allopetalia* Selys, 1873 (2 species); *Amphiaeschna* Selys, 1871 (1 species); *Anaciaeschna* Selys, 1878 (7 species); *Anax* Leach, 1815 (37 species); *Andaeschna* De Marmels, 1994 (5 species); *Antipodophlebia* Fraser, 1960 (1 species); *Austroaeschna* Selys, 1883 (20 species); *Austrogynacantha* Tillyard, 1908 (1 species); *Austrophlebia* Tillyard, 1916 (2 species); *Basiaeschna* Selys, 1883 (1 species); *Boyeria* McLachlan, 1896 (7 species); *Brachytron* Evans, 1845 (3 species); *Caliaeschna* Selys, 1883 (1 species); *Castoraeschna* Calvert, 1952 (9 species); *Cephalaeschna* Selys, 1883 (30 species); *Coryphaeschna* Williamson, 1903 (8 species); *Dendroaeschna* Tillyard, 1916 (1 species); *Dromaeschna* Förster, 1908 (2 species); *Epiaeschna* Hagen in Selys, 1883 (1 species); *Gomphaeschna* Selys, 1871 (2 species); *Gynacantha* Rambur, 1842 (101 species); *Gynacanthaeschna* Fraser, 1921 (1 species); *Heliaeschna* Selys, 1882 (11 species); *Indaeschna* Fraser, 1926 (5 species); *Isoaeschna* Schneider, Vierstraete, Kosterin, Ikemeyer, Hu, Snegovaya & Dumont, 2023 (1 species); *Limnetron* Förster, 1907 (2 species); *Linaeschna* Martin, 1908 (1 species); *Nasiaeschna* Selys in Förster, 1900 (1 species); *Neuraeschna* Hagen, 1867 (15 species); *Notoaeschna* Tillyard, 1916 (2 species); *Oligoaeschna* Selys, 1889 (19 species); *Oplonaeschna* Selys, 1883 (2 species); *Oreaeschna* Lieftinck, 1937 (2 species); *Periaeschna* Martin, 1909 (12 species); *Petaliaeschna* Fraser, 1927 (5 species); *Pinheyschna* Peters & Theischinger, 2011 (6 species); *Plattycantha* Förster, 1908 (3 species); *Racenaeschna* Calvert, 1958 (1 species); *Remartinia* Navás, 1911 (4 species); *Rhionaeschna* Förster, 1909 (42 species); *Sarasaeschna* Karube & Yeh, 2001 (18 species); *Spinaeschna* Theischinger, 1982 (2 species); *Staurophlebia* Brauer, 1865 (5 species); *Sundaeschna* Kiyoshi & Katatani, 2018 (2 species); *Telephlebia* Selys, 1883 (6 species); *Tetracanthagyna* Selys, 1883 (5 species); *Triacanthagyna* Selys, 1883 (9 species); *Zosteraeschna* Peters & Theischinger, 2011 (3 species).

Superfamily Gomphoidea Rambur, 1842 (2 families, 106 genera, 1019 species) [**Note 24**]
Family Petaluridae Needham, 1903 (5 genera, 10 species) [**Note 25**]
Genera: *Petalura* Leach, 1815 (4 species); *Phenes* Rambur, 1842 (1 species); *Tachopteryx* Uhler in Selys, 1859 (1 species); *Tanypteryx* Kennedy, 1917 (2 species); *Uropetala* Selys, 1858 (2 species).
Family Gomphidae Rambur, 1842 (101 genera, 1009 species) [**Note 26**]
Genera: *Acrogomphus* Laidlaw, 1925 (4 species); *Agriogomphus* Selys, 1869 (4 species); *Amphigomphus* Chao, 1954 (3 species); *Anisogomphus* Selys, 1858 (15 species); *Anormogomphus* Selys, 1854 (3 species); *Antipodogomphus* Fraser, 1951 (6 species); *Aphylla* Selys, 1854 (24 species); *Archaeogomphus* Williamson, 1919 (7 species); *Arigomphus* Needham, 1897 (7 species); *Armagomphus* Carle, 1986 (1 species); *Asahinagomphus* Karube, 2021 (1 species); *Asiagomphus* Asahina, 1985 (28 species); *Austroepigomphus* Fraser, 1953 (3 species); *Austrogomphus* Selys, 1854 (15 species); *Borneogomphus* Karube & Sasamoto, 2014 (1 species); *Brasiliogomphus* Belle, 1995 (1 species); *Burmagomphus* Williamson, 1907 (30 species); *Cacoides* Cowley, 1934 (1 species); *Ceratogomphus* Selys, 1854 (2 species); *Cornigomphus* Martin, 1907 (2 species); *Crenigomphus* Selys, 1892 (6 species); *Cyanogomphus* Selys, 1873 (3 species); *Cyclogomphus* Selys, 1854 (5 species); *Davidioides* Fraser, 1924 (1 species); *Davidius* Selys, 1878 (22 species); *Desmogomphus* Williamson, 1920 (3 species); *Diaphlebia* Selys, 1854 (2 species); *Diastatomma* Charpentier in Burmeister, 1839 (6 species); *Dromogomphus* Selys, 1854 (3 species); *Dubitogomphus* Fraser, 1940 (3 species); *Ebegomphus* Needham, 1944 (5 species); *Eogomphus* Needham, 1941 (1 species); *Epigomphus* Hagen in Selys, 1854 (33 species); *Erpetogomphus* Selys, 1858 (24 species); *Euthygomphus* Kosterin, 2016 (9 species); *Fukienogomphus* Chao, 1954 (3 species); *Gastrogomphus* Needham, 1941 (1 species); *Gomphidia* Selys, 1854 (21 species); *Gomphidictinus* Fraser, 1942 (3 species); *Gomphoides* Selys, 1854 (4 species); *Gomphurus* Needham, 1901 (13 species); *Gomphus* Leach, 1815 (8 species); *Hagenius* Selys, 1854 (1 species); *Heliogomphus* Laidlaw, 1922 (21 species); *Hemigomphus* Selys, 1854 (7 species); *Hylogomphus* Needham, Westfall & May, 2000 (6 species); *Ictinogomphus* Cowley, 1934 (19 species); *Idiogomphoides* Belle, 1984 (3 species); *Isomma* Selys, 1892 (3 species); *Labrogomphus* Needham, 1931 (1 species); *Lamelligomphus* Fraser, 1922 (16 species); *Lanthus* Needham, 1897 (3 species); *Leptogomphus* Selys, 1878 (24 species); *Lestinogomphus* Martin, 1911 (10 species); *Libyogomphus* Fraser, 1926 (5 species); *Lindenia* de Haan, 1826 (1 species); *Macrogomphus* Selys, 1858 (15 species); *Mastigogomphus* Cammaerts, 2004 (3 species); *Mattigomphus* Karube & Kosterin, 2018 (2 species); *Megalogomphus* Campion, 1923 (12 species); *Melanocacus* Belle, 1986 (2 species); *Melligomphus* Chao, 1990 (11 species); *Merogomphus* Martin, 1904 (9 species); *Microgomphus* Selys, 1858 (17 species); *Neogomphus* Selys, 1858 (3 species); *Nepogomphoides* Fraser, 1952 (1 species); *Nepogomphus* Fraser, 1934 (3 species); *Neurogomphus* Karsch, 1890 (14 species); *Nihonogomphus* Oguma, 1926 (18 species); *Notogomphus* Selys, 1858 (20 species); *Nychogomphus* Carle, 1986 (8 species); *Octogomphus* Selys, 1873 (1 species); *Odontogomphus* Watson, 1991 (1 species); *Onychogomphus* Selys, 1854 (34 species); *Ophiogomphus* Selys, 1854 (26 species); *Orientogomphus* Chao & Xu, 1987 (7 species); *Paragomphus* Cowley, 1934 (48 species); *Perigomphus* Belle, 1972 (3 species); *Perissogomphus* Laidlaw, 1922 (1 species); *Peruviogomphus* Klots, 1944 (3 species); *Phaenandrogomphus* Lieftinck, 1964 (7 species); *Phanogomphus* Carle, 1986 (17 species); *Phyllocycla* Calvert, 1948 (31 species); *Phyllogomphoides* Belle, 1970 (47 species); *Phyllogomphus* Selys, 1854 (11 species); *Platygomphus* Selys, 1854 (3 species); *Praeviogomphus* Belle, 1995 (1 species); *Progomphus* Selys, 1854 (70 species); *Scalmogomphus* Chao, 1990 (5 species); *Shaogomphus* Chao, 1984 (3 species); *Sieboldius* Selys, 1854 (8 species); *Sinictinogomphus* Fraser, 1939 (1 species); *Sinogomphus* May, 1935 (11 species); *Stenogomphurus* Carle, 1986 (2 species); *Stylogomphus* Fraser, 1922 (15 species); *Stylurus* Needham, 1897 (27 species); *Tibiagomphus* Belle, 1992 (2 species); *Tragogomphus* Sjöstedt, 1899 (3 species); *Trigomphus* Bartenev, 1912 (14 species); *Zephyrogomphus* Watson, 1991 (2 species); *Zonophora* Selys, 1854 (10 species).

Superfamily Cordulegastroidea Hagen, 1877 (3 families, 9 genera, 106 species) **[Note 27]**

Family Chlorogomphidae Needham, 1903 (3 genera, 56 species)

Genera: *Chlorogomphus* Selys, 1854 (48 species); *Chloropetalia* Carle, 1995 (4 species); *Watanabeopetalia* Karube, 2002 (4 species).

Family Cordulegastridae Hagen, 1875 (5 genera, 49 species)

Genera: *Anotogaster* Selys, 1854 (11 species); *Cordulegaster* Leach, 1815 (10 species); *Neallogaster* Cowley, 1934 (8 species); *Thecagaster* Selys, 1854 (11 species); *Zoraena* Kirby, 1890 (9 species).

Family Neopetaliidae Tillyard & Fraser, 1940 (1 genus, 1 species)

Genera: *Neopetalia* Cowley, 1934 (1 species).

Superfamily Libelluloidea Leach, 1815 (13 families, 195 genera, 1477 species) **[Note 28]**

Family Pseudocorduliidae Lohman 1996 (1 genus, 2 species) **[Note 29]**

Genera: *Pseudocordulia* Tillyard, 1909 (2 species).

Family Gomphomacromiidae Tillyard & Fraser, 1940 (2 genera, 7 species)

Genera: *Archaeophya* Fraser, 1959 (2 species); *Gomphomacromia* Brauer, 1864 (5 species).

Family Synthemistidae Tillyard, 1910 (11 genera, 51 species) **[Note 30]**

Genera: *Archaeosynthemis* Carle, 1995 (5 species); *Austrosynthemis* Carle, 1995 (1 species); *Calesynthemis* Carle, 1995 (7 species); *Choristhemis* Tillyard, 1910 (2 species); *Eusynthemis* Förster, 1903 (15 species); *Neocaledosynthemis* Fleck, 2024 (2 species); *Palaeosynthemis* Förster, 1903 (13 species); *Parasynthemis* Carle, 1995 (1 species); *Synthemiopsis* Tillyard, 1917 (1 species); *Synthemis* Selys, 1871 (2 species); *Tonyosynthemis* Theischinger, 1998 (2 species).

Family Austrocorduliidae Bechly, 1996 (7 genera, 16 species) **[Note 31, Note 32]**

Genera: *Apocordulia* Watson, 1980 (1 species); *Austrocordulia* Tillyard, 1909 (3 species); *Austrophya* Tillyard, 1909 (2 species); *Cordulephya* Selys, 1871 (4 species); *Hesperocordulia* Tillyard, 1911 (1 species); *Lathrocordulia* Tillyard, 1911 (2 species); *Micromidia* Fraser, 1959 (3 species).

Family Idionychidae Tillyard & Fraser, 1940 (1 genus, 29 species) **[Note 33]**

Genera: *Idionyx* Hagen, 1867 (29 species).

Family Macromiidae Needham, 1903 (3 genera, 125 species) **[Note 34]**

Genera: *Epophthalmia* Burmeister, 1839 (5 species); *Macromia* Rambur, 1842 (84 species); *Phyllomacromia* Selys, 1878 (36 species).

Family Idomacromiidae Tillyard & Fraser, 1940 (5 genera, 31 species) **[Note 32, Note 35]**

Genera: *Idomacromia* Karsch, 1896 (3 species); *Neocordulia* Selys, 1882 (17 species); *Nesocordulia* McLachlan, 1882 (6 species); *Oxygastra* Selys, 1871 (1 species); *Syncordulia* Selys, 1882 (4 species).

Family Lauromacromiidae Goodman, Abbott, Bybee, Ehlert, Frandsen, Guralnick, Kalkman, Newton, Parise Pinto & Ware 2026 (1 genus, 6 species) **[Note 36]**

Genera: *Lauromacromia* Geijskes, 1970 (6 species).

Family Macromidiidae Goodman, Abbott, Bybee, Ehlert, Frandsen, Guralnick, Kalkman, Newton, Parise Pinto & Ware 2026 (1 genus, 10 species) **[Note 37, Note 32]**

Genera: *Macromidia* Martin, 1907 (10 species).

Family Neophyidae Tillyard & Fraser 1940 (1 genus, 1 species) **[Note 38]**

Genera: *Neophya* Selys, 1881 (1 species).

Family Corduliidae Selys, 1850 (18 genera, 149 species) **[Note 39]**

Genera: *Antipodochlora* Fraser, 1939 (1 species); *Cordulia* Leach, 1815 (2 species); *Corduliochlora* Marinov & Seidenbusch, 2007 (1 species); *Cordulisantosia* Fleck & Costa, 2007 (3 species); *Dorocordulia* Needham, 1901 (2 species); *Epitheca* Charpentier, 1840 (12 species); *Guadalca* Kimmins, 1957 (1 species); *Helocordulia* Needham, 1901 (2 species); *Hemicordulia* Selys, 1871 (41 species); *Heteronaias* Needham & Gyger, 1937 (1 species); *Metaphya* Laidlaw, 1912 (3 species); *Navicordulia* Machado & Costa, 1995 (12 species); *Neurocordulia* Selys, 1871 (7 species); *Paracordulia* Martin, 1906 (2 species); *Procordulia* Martin, 1907 (18 species); *Rialla* Navás, 1915 (1 species); *Somatochlora* Selys, 1871 (38 species); *Williamsonia* Davis, 1913 (2 species).

Family Aeschnosomatidae Fleck in Fleck, De Marmels & Theischinger (2020) (4 genera, 12 species) **[Note 40]**

Genera: *Aeschnosoma* Selys, 1871 (9 species); *Libellulosoma* Martin, 1907 (1 species); *Pentathemis* Karsch, 1890 (1 species); *Schizocordulia* Machado, 2005 (1 species).

Family Libellulidae Leach, 1815 (140 genera, 1,038 species) **[Note 41]**

Genera: *Acisoma* Rambur, 1842 (6 species); *Aethiothemis* Martin, 1908 (13 species); *Aethriamanta* Kirby, 1889 (6 species); *Agrionoptera* Brauer, 1864 (8 species); *Akrothemis* Theischinger & Richards, 2012 (2 species); *Amphithemis* Selys, 1891 (3 species); *Anatya* Kirby, 1889 (2 species); *Antidythemis* Kirby, 1889 (2 species); *Archaeophlebia* Ris, 1909 (1 species); *Argyrothemis* Ris, 1911 (1 species); *Atoconeura* Karsch, 1899 (6 species); *Atratothemis* Wilson, 2005 (1 species); *Austrothemis* Ris, 1909 (1 species); *Bironides* Förster, 1903 (5 species); *Boninthemis* Asahina, 1952 (1 species); *Brachydiplax* Brauer, 1868 (7 species); *Brachygonia* Kirby, 1889 (3 species); *Brachymesia* Kirby, 1889 (3 species); *Brachythemis* Brauer, 1868 (6 species); *Bradinopyga* Kirby, 1893 (4 species); *Brechmorhoga* Kirby, 1894 (16 species); *Calophlebia* Selys, 1896 (1 species); *Camacinia* Kirby, 1889 (3 species); *Cannaphila* Kirby, 1889 (3 species); *Carajathemis* Machado, 2012 (1 species); *Celebophlebia* Lieftinck, 1936 (2 species); *Celebothemis* Ris, 1909 (1 species); *Celithemis* Hagen, 1861 (8 species); *Chalcostephia* Kirby, 1889 (1 species); *Chalybeothemis* Lieftinck, 1933 (3 species); *Cratilla* Kirby, 1900 (2 species); *Crocothemis* Brauer, 1868 (9 species); *Cyanothemis* Ris, 1915 (1 species); *Dasythemis* Karsch, 1889 (4 species); *Deielia* Kirby, 1889 (1 species); *Diastatops* Rambur, 1842 (8 species); *Diplacina* Brauer, 1868 (28 species); *Diplacodes* Kirby, 1889 (10 species); *Dythemis* Hagen,

1861 (7 species); *Edonis* Needham, 1905 (1 species); *Elasmothemis* Westfall, 1988 (8 species); *Eleuthemis* Ris, 1910 (5 species); *Elga* Ris, 1911 (2 species); *Epithemis* Laidlaw, 1955 (2 species); *Erythemis* Hagen, 1861 (10 species); *Erythrodiplax* Brauer, 1868 (61 species); *Fylgia* Kirby, 1889 (1 species); *Garrisonia* Penalva & Costa, 2007 (1 species); *Gynothemis* Calvert, 1909 (4 species); *Hadrothemis* Karsch, 1891 (7 species); *Hemistigma* Kirby, 1889 (2 species); *Huonia* Förster, 1903 (15 species); *Hydrobasileus* Kirby, 1889 (3 species); *Hylaeothemis* Ris, 1909 (4 species); *Hypothemis* Karsch, 1889 (1 species); *Idiataphe* Cowley, 1934 (4 species); *Indothemis* Ris, 1909 (2 species); *Ladona* Needham, 1897 (3 species); *Lanthanusa* Ris, 1909 (7 species); *Lathrecista* Kirby, 1889 (1 species); *Leucorrhinia* Brittinger, 1850 (14 species); *Libellula* Linnaeus, 1758 (28 species); *Lyriothemis* Brauer, 1868 (18 species); *Macrodiplax* Brauer, 1868 (2 species); *Macrothemis* Hagen, 1868 (42 species); *Malgassophlebia* Fraser, 1956 (6 species); *Miathyria* Kirby, 1889 (2 species); *Micrathyria* Kirby, 1889 (48 species); *Micromacromia* Karsch, 1890 (4 species); *Microtrigonia* Förster, 1903 (5 species); *Misagria* Kirby, 1889 (4 species); *Nannodiplax* Brauer, 1868 (1 species); *Nannophlebia* Selys, 1878 (26 species); *Nannophya* Rambur, 1842 (8 species); *Nannophyopsis* Lieftinck, 1935 (2 species); *Nannothemis* Brauer, 1868 (1 species); *Neodythemis* Karsch, 1889 (14 species); *Nephepeltia* Kirby, 1889 (6 species); *Nesciothemis* Longfield, 1955 (5 species); *Nesogonia* Kirby, 1898 (1 species); *Nesoxenia* Kirby, 1889 (2 species); *Neurothemis* Brauer, 1867 (17 species); *Nothodiplax* Belle, 1984 (1 species); *Notiothemis* Ris, 1919 (2 species); *Notolibellula* Theischinger & Watson, 1977 (1 species); *Oligoclada* Karsch, 1890 (25 species); *Olpogastra* Karsch, 1895 (1 species); *Onychothemis* Brauer, 1868 (7 species); *Orchithemis* Brauer, 1878 (3 species); *Orionothemis* Fleck, Hamada & Carvalho, 2009 (1 species); *Orthemis* Hagen, 1861 (28 species); *Orthetrum* Newman, 1833 (66 species); *Oxythemis* Ris, 1910 (1 species); *Pachydiplax* Brauer, 1868 (1 species); *Pacificothemis* Asahina, 1940 (1 species); *Palaeothemis* Fraser, 1923 (1 species); *Palpopleura* Rambur, 1842 (7 species); *Paltothemis* Karsch, 1890 (3 species); *Pantala* Hagen, 1861 (2 species); *Parazyxomma* Pinhey, 1961 (1 species); *Perithemis* Hagen, 1861 (12 species); *Phyllothemis* Fraser, 1935 (2 species); *Planiplax* Muttkowski, 1910 (5 species); *Plathemis* Hagen, 1861 (2 species); *Pornothemis* Krüger, 1902 (2 species); *Porpax* Karsch, 1896 (6 species); *Potamarcha* Karsch, 1890 (2 species); *Protorthemis* Kirby, 1889 (4 species); *Pseudagrionoptera* Ris, 1909 (1 species); *Pseudoleon* Kirby, 1889 (1 species); *Pseudothemis* Kirby, 1889 (2 species); *Pseudotramea* Fraser, 1920 (1 species); *Raphismia* Kirby, 1889 (2 species); *Rhodopygia* Kirby, 1889 (5 species); *Rhodothemis* Ris, 1909 (4 species); *Rhyothemis* Hagen, 1867 (23 species); *Risiophlebia* Cowley, 1934 (2 species); *Scapanea* Kirby, 1889 (1 species); *Selysiothemis* Ris, 1897 (1 species); *Sympetrum* Newman, 1833 (58 species); *Tapeinothemis* Lieftinck, 1950 (1 species); *Tauriphila* Kirby, 1889 (5 species); *Tetrathemis* Brauer, 1868 (14 species); *Thalassothemis* Ris, 1909 (1 species); *Thermochoria* Kirby, 1889 (2 species); *Thermorthemis* Kirby, 1889 (2 species); *Tholymis* Hagen, 1867 (2 species); *Tramea* Hagen, 1861 (21 species); *Trithemis* Brauer, 1868 (50 species); *Trithetrum* Dijkstra & Pilgrim, 2007 (2 species); *Tyriobapta* Kirby, 1889 (3 species); *Uracis* Rambur, 1842 (7 species); *Urothemis* Brauer, 1868 (9 species); *Viridithemis* Fraser, 1960 (1 species); *Ypirangathemis* Santos, 1945 (1 species); *Zenithoptera* Selys, 1869 (4 species); *Zygonoides* Fraser, 1957 (4 species); *Zygonychidium* Lindley, 1970 (1 species); *Zygonyx* Selys in Hagen, 1867 (24 species); *Zyxomma* Rambur, 1842 (6 species).

Table 2. Number of genera and species of superfamilies and families and their distribution across nine biogeographical regions. *Sciotropis* (incertae sedis) is not included in the count of superfamilies per biogeographical region. The counts of the genera and species is based on Paulson et al. (2025; downloaded May 1, 2025).

	Genera	Species	Average per genus	Palaearctic	Nearctic	Indo Malayan	Neotropical	Afrotropical	Madagascar& Seychelles	Australasia	Oceania	Wallacea
ZYGOPTERA												
Lestoidea (4 families)	21	201										
Hemiphlebiidae	1	1	1							•		
Lestidae	9	148	16	•	•	•	•	•	•	•	•	•
Perilestidae	2	21	11				•					
Synlestidae	9	31	3				•	•		•		
Platystictoidea (1 family)	10	284										
Platystictidae	10	284	28		•	•	•			•	•	
Priscagrionoidea (1 family)	2	5	3									
Priscagrionidae	2	5	3			•						
Tatocnemoidea (3 families)	3	21										
Pentaphlebiidae	1	3	3					•				
Protolestidae	1	8	8						•			
Tatocnemididae	1	10	10						•			
Polythoroidea (7 families)	18	192										
Dicteriadidae	2	2	1				•					
Heteragrionidae	4	76	19				•					

	Genera	Species	Average per genus	Palaearctic	Nearctic	Indo Malayan	Neotropical	Afrotropical	Madagascar& Seychelles	Australasia	Oceania	Wallacea
Hypolestidae	1	3	3				•					
Mesagrionidae	1	1	1				•					
Philogeniidae	2	46	23				•					
Polythoridae	7	63	9				•					
Rimanellidae	1	1	1				•					
Mesopodagrionoidea (2 families)	2	3										
Amanipodagrionidae	1	1	1					•				
Mesopodagrionidae	1	2	2			•						
Amphipterygoidea (4 families)	8	65										
Amphipterygidae	1	5	5				•					
Devadattidae	1	14	14			•						
Rhipidolestidae	4	30	8	•		•						
Thaumatoneuridae	2	16	8				•					
Euphaeoidea (3 families)	12	90										
Euphaeidae	9	80	9	•		•						
Lestoideidae	2	9	5							•		
Pseudolestidae	1	1	1			•						
Philogangoidea (2 families)	3	17										
Philogangidae	1	4	4			•						
Philosinidae	2	13	7			•						•
Megapodagrionoidea (2 families)	23	156										
Argiolestidae	20	127	6			•		•	•	•		•
Megapodagrionidae	3	29	10				•					
Calopterygoidea (2 families)	41	347										
Calopterygidae	21	183	9	•	•	•	•	•	•	•		•
Chlorocyphidae	19	162	9	•		•		•		•		•
Coenagrionoidea (3 families)	175	1951										
Coenagrionidae	121	1420	12	•	•	•	•	•	•	•	•	•
Isostictidae	12	46	4							•		•
Platycnemididae	42	485	12	•		•		•	•	•		•
Sciotropis Incertae sedis	1	2	2				•					
ANISOZYGOPTERA												
Epiophlebioidea (1 family)	1	3										
Epiophlebiidae	1	3	3	•		•						
ANISOPTERA												
Aeshnoidea (2 families)	58	510										
Aeshnidae	54	499	9	•	•	•	•	•	•	•	•	•
Austropetaliidae	4	11	3				•			•		
Gomphoidea (2 families)	106	1019										
Petaluridae	5	10	2	•	•		•			•		
Gomphidae	101	1009	10	•	•	•	•	•	•	•		•
Cordulegastroidea (3 families)	9	106										
Chlorogomphidae	3	56	19	•		•						•
Cordulegastridae	5	49	10	•	•	•	•					
Neopetaliidae	1	1	1				•					
Libelluloidea (13 families)	195	1477										
Aeschnosomatidae	4	12	3				•		•	•		
Austrocorduliidae	7	16	2							•		
Corduliidae	18	149	8	•	•	•	•	•	•	•		•
Gomphomacromiidae	2	7	4				•			•		

	Genera	Species	Average per genus	Palaearctic	Nearctic	Indo Malayan	Neotropical	Afrotropical	Madagascar& Seychelles	Australasia	Oceania	Wallacea
Idionychidae	1	29	29			•						•
Idomacromiidae	5	31	6	•			•	•	•			
Lauromacromiidae	1	6	6				•					
Libellulidae	140	1038	7	•	•	•	•	•	•	•	•	•
Macromidiidae	1	10	10	•		•						•
Macromiidae	3	125	42	•	•	•		•	•	•		•
Neophyidae	1	1	1					•				
Pseudocorduliidae	1	2	2							•		
Synthemistidae	11	51	5							•		
Total	687	6447	9									
Number of families per region				18	11	25	29	16	14	23	5	16
Number of superfamilies per region				10	8	15	11	9	8	9	5	9

Table 1 only includes information on extant taxa and for an overview of extinct groups we refer to Nel & Piney (2022). In addition to the names used in Table 1, several other names are regularly used in publications:

Caloptera is used as an informal name for a non-monophyletic group of damselfly families belonging to the Calopterygoidea in the old sense but excluding the 'megapodagrionid' families. Most authors using this name are aware that the group itself is non-monophyletic but use it as a convenient way to address a series of damselfly families whose members are colorful, wings non- or short-petiolated and often with extensive colouration patterns on the wings. Families considered to represent Caloptera include Calopterygidae, Chlorocyphidae, Devadattidae, Dicteriatidae, Euphaeidae, Polythoridae, Philogangidae and Philosinidae, *inter alia*.

Cavilabiata has been occasionally used to denote a monophyletic group consisting of the superfamilies Libelluloidea and Cordulegastroidea, which share a scoop-shaped labium in the nymphs. This name has occasionally erroneously been used to describe just Libelluloidea, but it was coined by Bechly (1996) to denote a grouping comprising both the two superfamilies based on, among other things, venation patterns.

Epiprocta is regularly used at the suborder level that combines the monophyletic Anisoptera with the presumably para- or polyphyletic Anisozygoptera (see Note 21) (Lohmann, 1996).

Table 3 provides a comparison with the classification used at the start of this century (Silsby, 2001). The classification of Odonata has changed dramatically mainly due to improved phylogenetic insights resulting from the application of molecular analysis. As a result, the number of recognised superfamilies increased from eight to 17 and the number of families from 28 to 55.

Notes

Note 01 The classification of Zygoptera has changed dramatically in the past twenty years, increasing from 18 families divided into 4 superfamilies by Silsby (2001) to 34 families in 12 superfamilies in the present paper. Key changes are the division of Amphipterygidae into four families (Amphipterygidae, Devadattidae, Rimanellidae, Pentaphlebiidae) and the division of Megapodagrionidae into a large grouping of 16 families (Amanipodagrionidae, Argiolestidae, Heteragrionidae, Hypolestidae, Megapodagrionidae, Mesagrionidae, Mesopodagrionidae, Philogangidae, Philogeniidae, Philosinidae, Priscagrionidae, Protolestidae, Pseudolestidae, Rhipidolestidae, Tatocnemidae, and Thaumatoneuridae). Dijkstra et al. (2014) and Bybee et al. (2021) included most of these families in an expanded superfamily 'Calopterygoidea' s.l., although at the time it was already recognised as a non-monophyletic group. Newton et al. (2026) provided strong support for the families re- or established in the past two decades and established the inter-familial relationships. Based on this, it has been possible for the present paper to define monophyletic superfamilies to include the families previously included in 'Calopterygoidea' *sensu lato*.

Note 02 Probably due to the low number of genes analysed, both Dijkstra et al. (2014) and Simaika et al. (2020) failed to retrieve Synlestidae and Perilestidae as monophyletic. Newton et al. (2026) found both families to be monophyletic although Perilestidae was only represented by a single taxon. They also confirmed that the African *Nubiolestes* is nested into Synlestidae. Resolving the status of the two families and their genera will require an analysis including a larger number of taxa.

Note 03 Both Dijkstra et al. (2014), Newton et al. (2026) and Simonsen et al. (2022) show that *Austrolestes* and

Table 3. Comparison between the current classification and the classification used by Silsby (2001).

Superfamily 17 superfamilies	**Family** 55 families	**Superfamily (Silsby, 2001)** 8 superfamilies	**Family (Silsby, 2001)** 28 families
Lestoidea	Hemiphlebiidae	Hemiphlebioidea	Hemiphlebiidae
	Perilestidae	Lestoidea	Perilestidae
	Synlestidae	Lestoidea	Synlestidae
	Lestidae	Lestoidea	Lestidae
Platystictoidea	Platystictidae	Coenagrionoidea	Platystictidae
Priscagrionoidea	Priscagrionidae	Lestoidea	Megapodagrionidae
Tatocnemoidea	Protolestidae	Lestoidea	Megapodagrionidae
	Tatocnemidae	Lestoidea	Megapodagrionidae
	Pentaphlebiidae	Calopterygoidea	Amphipterygidae
Polythoroidea	Polythoridae	Calopterygoidea	Polythoridae
	Rimanellidae	Calopterygoidea	Amphipterygidae
	Dicteriadidae	Calopterygoidea	Dicteriadidae
	Mesagrionidae	Lestoidea	Megapodagrionidae
	Hypolestidae	Lestoidea	Megapodagrionidae
	Heteragrionidae	Lestoidea	Megapodagrionidae
	Philogeniidae	Lestoidea	Megapodagrionidae
Mesopodagrionoidea	Amanipodagrionidae	Lestoidea	Megapodagrionidae
	Mesopodagrionidae	Lestoidea	Megapodagrionidae
Amphipterygoidea	Amphipterygidae	Calopterygoidea	Amphipterygidae
	Devadattidae	Calopterygoidea	Amphipterygidae
	Rhipidolestidae	Lestoidea	Megapodagrionidae
	Thaumatoneuridae	Lestoidea	Megapodagrionidae
Euphaeoidea	Euphaeidae	Calopterygoidea	Euphaeidae
	Lestoideidae	Lestoidea	Perilestidae
	Pseudolestidae	Lestoidea	Megapodagrionidae
Philogangoidea	Philogangidae	Lestoidea	Megapodagrionidae
	Philosinidae	Lestoidea	Megapodagrionidae
Megapodagrionoidea	Megapodagrionidae	Lestoidea	Megapodagrionidae
	Argiolestidae	Lestoidea	Megapodagrionidae
Calopterygoidea	Calopterygidae	Calopterygoidea	Calopterygidae
	Chlorocyphidae	Calopterygoidea	Chlorocyphidae
Coenagrionoidea	Isostictidae	Coenagrionoidea	Isostictidae
	Platycnemididae	Coenagrionoidea	Platycnemididae + Protoneuridae (part)
	Coenagrionidae	Coenagrionoidea	Coenagrionidae + Pseudostigmatidae + Protoneuridae (part)
Epiophlebioidea	Epiophlebiidae	Epiophlebioidea	Epiophlebiidae
Aeshnoidea	Austropetaliidae	Aeshnoidea	Neopetaliidae
	Aeshnidae	Aeshnoidea	Aeshnidae
Gomphoidea	Petaluridae	Aeshnoidea	Petaluridae
	Gomphidae	Aeshnoidea	Gomphidae
Cordulegastroidea	Chlorogomphidae	Libelluloidea	Chlorogomphidae
	Cordulegastridae	Cordulegastroidea	Cordulegastridae
	Neopetaliidae	Aeshnoidea	Neopetaliidae
Libelluloidea	Pseudocorduliidae	Libelluloidea	Corduliidae
	Gomphomacromiidae	Libelluloidea	Synthemistidae?
	Synthemistidae	Libelluloidea	Synthemistidae
	Austrocorduliidae	Libelluloidea	Corduliidae
	Idionychidae	Libelluloidea	Corduliidae
	Macromiidae	Libelluloidea	Macromiidae
	Idomacromiidae	Libelluloidea	Corduliidae
	Lauromacromiidae	Libelluloidea	Corduliidae
	Macromidiidae	Libelluloidea	Corduliidae
	Neophyidae	Libelluloidea	Corduliidae
	Corduliidae	Libelluloidea	Corduliidae
	Aeschnosomatidae	Libelluloidea	Corduliidae
	Libellulidae	Libelluloidea	Libellulidae

Indolestes are sister groups that do not form a monophyletic group with *Sympecma* so that support for the subfamily Sympecmatinae is lacking. A revision of Lestidae is needed to determine if subfamilies can be defined within Lestidae. The genus *Lestes* contains 80 species found in all continents except for Antarctica. Further work is likely to show that the lineages of the genus *Lestes* are highly divergent, which would support the reestablishment and erection of additional genera (Simonsen et al., 2022).

Note 04 The position of Platystictoidea with its sole family Platystictidae as sister to all Zygoptera with the exception of the superfamily Lestoidea is well supported based on molecular data (Bybee et al., 2008, 2021; Dijkstra et al., 2014; Newton et al., 2026; van Tol et al., 2009). Molecular support for the subfamilies of Platystictidae is provided by Bedjanič et al. (2016) and Dijkstra et al. (2014). Neither of the two largest genera, *Protosticta* and *Drepanosticta,* is monophyletic. Their classification requires a revision that will probably include the description of additional genera. Species of Platystictoidea are inconspicuous, have generally small ranges and can reach a high diversity in small areas. In the past two decades, many publications described new species, including some which introduced five or more species (Bedjanič et al., 2016; Dow & Orr, 2012; van Tol 2000, 2005, 2007a, 2007b). Moreover many undescribed species from poorly explored areas, such as Sumatra, Kalimantan, the Philippines and New Guinea in Southeast Asia and northwestern South America countries in the Neotropics, are undoubtedly present in collections or await collection.

Note 05 The superfamily Priscagrionoidea **stat. nov.** consists of a single family containing *Priscagrion* (two species) and *Sinocnemis* (three species). Both genera are confined to southwest and central China and northern Vietnam and are found at montane forested streams, creeks and brooks at altitudes ranging from 1000 to 2000 m. Dijkstra et al. (2014) first recognised the family as a separate group and Bybee et al. (2021) formally described it. Bybee et al. (2021) and Newton et al. (2026) provide strong support for *Priscagrion* and *Sinocnemis* being each other's closest relatives and show that the family Priscagrionidae is first to diverge from all other families previously regarded to belong to Calopterygoidea. *Priscagrion* unusually has three (hindwing) to four (forewing) antenodal crossveins (just two in *Sinocnemis*). In both genera the genital ligula has a long, drawn-out internal fold. Of the five species included in the superfamily only the nymph of *Priscagrion kiautai* Zhou & WIlson, 2001 has been described (Yu, 2026). The nymphs of this species are slender, with long legs with a distinct pale colour pattern and have relatively long saccoid caudal gills with long terminal filaments. Although the nymphs are very similar to those of *Philoganga*, from which they may be distinguished by minor differences, there are no clear apomorphies that set them apart from all other families previously belonging to Calopterygoidea.

Note 06 The superfamily Tatocnemidoidea **stat. nov.** consists of three strictly Afrotropical families Protolestidae, Tatocnemididae and Pentaphlebiidae. The superfamily is sister to the Neotropical superfamily Polythoroidea, suggesting a shared Gondwanan origin. All three families of Tatocnemidoidea consist of a single genus with Protolestidae (*Protolestes*, eight species) and Tatocnemididae (*Tatocnemis*, ten species) restricted to Madagascar and Pentaphlebiidae (*Pentaphlebia*, three species) restricted to the rainforests of Central Africa.

Note 07 The superfamily Polythoroidea **stat. nov.** is established for seven families that together form a monophyletic group restricted to lotic habitats in the Neotropical region. Several of the included families exhibit distinct apomorphies that clearly set them apart from other families of the superfamily, but no convincing shared morphological characters are currently known to support their relationship. Morphology of the nymphs might provide synapomorphies; however, this has not yet been evaluated into a phylogenetic analysis. However, some shared putative apomorphic characters have been proposed (cf. Fleck et al., 2012; Kalkman et al., 2010). With the exception of the genera included in Polythoridae and Dicteriadidae, most genera now included in this superfamily were, at the start of this century, generally placed in Megapodagrionidae.

The family Dicteriadidae consists of only two monotypic genera, *Dicterias* and *Heliocharis* (Dunkle, 1991). *Heliocharis amazona* Selys, 1853 is widely distributed in tropical South America, while *Dicterias atrosanguinea* Selys, 1853 is restricted to lowland areas in the Amazon basin in Brazil (Garrison et al., 2010; Pinto, 2024). This family possesses several convincing apomorphies, including an anteriorly widened postclypeus and extremely long legs with vestigial spurs.

The family Hypolestidae consists of a single genus with three species restricted to Cuba, Jamaica, and Hispaniola (Torres-Cambas, 2017). The molecular analyses of Dijkstra et al. (2014) first suggested a close relationship between Dicteriadidae and Hypolestidae. In Newton et al. (2026), *Heliocharis* is found to be more closely related to *Hypolestes* than to *Dicterias*. If this relationship is corroborated by future studies, the three genera should be united in the family Hypolestidae, with Dicteriadidae becoming a junior synonym.

The family Heteragrionidae includes four Neotropical genera: *Dimeragrion, Heteragrion*, *Heteropodagrion*, and *Oxystigma*. Rácenis (1959) established the family as a tribe of Megapodagrionidae to include the Australasian *Podolestes*, the Madagascan *Protolestes,* and the Neotropical *Neuragrion* (= *Heteropodagrion*) and *Heteragrion*. It was reinstated and restricted to *Heteragrion* and *Oxystigma* by Dijkstra et al. (2014) and was later expanded to include *Dimeragrion* and *Heteropodagrion* by Bybee et al. (2021). However, the position of *Hetero-*

podagrion needs to be re-evaluated as molecular support for inclusion of this genus is limited and as there are certain apomorphies in the resting position of the wings and similarities in nymphal morphology that are more similar to *Mesagrion* (Perez-Gutierrez & Montes-Fontalvo, 2011). The 62 species of *Heteragrion* have been taxonomically revised and illustrated (Vilela et al., 2023).

Mesagrionidae consists of a single genus with a single species, *Mesagrion leucorhinum* Selys, 1885. Dijkstra et al. (2014) placed it with *Dimeragrion* and *Heteropodagrion* in "Incertae sedis group 3." However, Bybee et al. (2021) found that it was not related to *Dimeragrion* and therefore placed it in its own family. The composition and relationship of this family is pending further analysis and further studies might show that *Heteropodagrion* should be included in Mesagrionidae as well or that the family as a whole is better merged with Heteragrionidae.

The two genera comprising the family Philogeniidae, *Archaeopodagrion* and *Philogenia*, are restricted to the Neotropical region. The 39 species of *Philogenia* occur from Central America southwards to Bolivia (Bota-Sierra, 2017; Cano-Cobos et al., 2023; Garrison et al., 2010; Vilela et al., 2019), and the seven species of *Archaeopodagrion* are restricted to Colombia and Ecuador (Amaya-Vallejo et al., 2021; Bota-Sierra, 2017, 2025; Garrison et al., 2010; Tennessen & Johnson, 2010). Although the group was already established by Rácenis (1959) as the tribe Phylogeniini in Megapodagrionidae the genera were, until recently, placed in Megapodagrionidae by most authors.

Polythoridae includes 63 species in seven genera restricted to Central and northern South America. It is one of the better-defined families, with distinctive morphological traits in both nymphs and adults, and is among the best studied in terms of phylogeny and biogeography (Sanchez-Herrera et al., 2018, 2020).

Rimanella was until recently considered to be part of Amphipterygidae (see Note 09) but Rimanellidae, a Davies & Tobin (1984) taxon, was reinstated by Dijkstra et al. (2014) and is now placed in its own family. Its single species, *Rimanella arcana* Needham, 1934, is restricted to streams above 800 meters in the Guiana Shield (Garrison et al., 2010; Geijskes, 1940; Needham & Fisher, 1940).

Note 08 The superfamily Mesopodagrionoidea **stat. nov.** is established here for two small families, Amanipodagrionidae and Mesopodagrionidae. Amanipodagrionidae has just one species and is apparently confined to a single stream in east Usambara Mts in Tanzania (Clausnitzer, 2003). Mesopodagrionidae contains a single genus with two species and is restricted to mountain brooks in China, Myanmar and the northern parts of Thailand and Vietnam (Kalkman, 2008; Yu & Bu, 2009). *Amanipodagrion gilliesi* Pinhey, 1962, the sole member of Amanipodagrionidae has no clear unique apomorphies but has the habit of perching with outstretched wings with the abdomen hanging down. This, together with the dark band on the wings, makes it unlike any other damselflies apart from some members of the distantly related Synlestidae and *Orolestes* (Lestidae). Conversely Mesopodagrionidae has clear apomorphies both in the adult (abdominal segment 10 with two short spines directed posteriorly) and nymphs (occipital lobes protruding at the side of the head and densely covered with spines and flat and fanlike horizontal gills, shared only with Argiolestidae) (Bybee et al., 2021). There are no shared derived characters known between the two families although these might be found with the description of the nymphs of *Amanipodagrion*.

Note 09 The families Amphipterygidae, Devadattidae, Thaumatoneuridae and Rhipidolestidae are grouped together in the newly established superfamily Amphipterygoidea **stat. nov**. After Novelo-Gutierrez (1995) removed *Diphlebia* and *Philoganga* from Amphipterygidae the family consisted of four disjunct genera, all having nymphs possessing internal extrusible gill tufts: *Amphipteryx*, *Devadatta*, *Pentaphlebia* and *Rimanella*. The molecular analyses of Bybee et al. (2008), Dumont et al. (2010) and Dijkstra et al. (2014) did not retrieve these four genera as a monophyletic group and, based on that, Dijkstra et al. (2014) placed each genus in its own family (Amphipterygidae, Devadattidae, Pentaphlebiidae, Rimanellidae). This was later supported by Bybee et al. (2021) and Newton et al. (2026). Newton et al. (2026) showed that Amphipterygidae and Devadattidae are sister groups. The family Amphipterygidae consist of one genus with five species found in Central America (Gonzalez-Soriano, 2010; Jocque & Argueta, 2014). The family Devadattidae consist of one genus with 14 species found in Sumatra, Borneo, Philippines and mainland southeast Asia reaching as far west as Northeast India (Dow et al., 2015; Phan et al., 2015; Sawant et al., 2024). Fraser (1938) established Thaumatoneuridae for the distinctive Central American *Thaumatoneura inopinata* McLachlan, 1897. Later, several studies recognized that the genus *Paraphlebia* is the sister group to *Thaumatoneura* and should be included in the family as well (Bybee et al., 2021; Dijkstra et al., 2014; Newton et al., 2026; Ortega-Salas et al., 2022). In the revision of the genus *Paraphlebia* Ortega-Salas et al. (2022) remark that *Paraphlebia* and *Thaumatoneura* both have male dimorphism, a trait uncommon in Odonata. Recent molecular-based phylogenies have shown the Asian genera (*Agriomorpha*, *Bornagriolestes*, *Burmargiolestes*, *Rhipidolestes*) form a sister group to Thaumatoneuridae and Bybee et al. (2021) placed these in an expanded Rhipidolestidae. Here the four families Amphipterygidae, Devadattidae, Thaumatoneuridae and Rhipidolestidae are included in the superfamily Amphipterygoidea.

Note 10 The monophyly of the three families within the superfamily Euphaeoidea **stat. nov.** is undisputed. A publication proposing to split Euphaeidae in two subfamilies based on molecular data is expected to be

published later in 2026. Adults of the two genera included in Lestoideidae differ considerably, but Novelo-Gutierrez (1995) suggested their relationship, mainly based on nymphal characters. This was later supported by molecular analysis (Bybee et al., 2021; Dijkstra et al., 2014; Newton et al., 2026). As the two genera look very different, with their last shared ancestor dating back almost 40 Mya, and as names were already available, Dijkstra et al. (2014) proposed placing them in their own subfamilies (Diphlebiinae and Lestoideinae).

Bybee et al. (2008) and Carle et al. (2008) first recognized the relation between the Asian family Euphaeidae and the Australian family Lestoideidae. Later analyses by Dijkstra et al. (2014) and Newton et al. (2026) corroborated this relationship. The position of Pseudolestidae as sister to both these families became only clear with the publication of Bybee et al. (2021) and was supported by Newton et al. (2026). The three families combined in this superfamily show little resemblance, and especially the nymphs are distinctly different. Pseudolestidae have gill tufts on S10 and balloon-like inflated caudal gills; Euphaeidae have saccoid caudal gills, lack gill tufts, but have lateral abdominal gills on segment 2 to 8 which have a respiratory function; Lestoideidae have saccoid caudal gills, and lack both gill tufts and lateral abdominal gills (Orr, 2024; Theischinger et al., 2021; Yu & Bu, 2011).

Note 11 The new superfamily Philogangoidea **stat. nov.** contains two small families, Philogangidae and Philosinidae, each represented by relatively large damselflies occurring at running waters. Philogangidae includes one genus of four species all found in more tropical parts of China, mainland southwest Asia and the Himalayan region of the Indian subcontinent.

Philosinidae includes two genera, *Rhinagrion* with ten species found in the Philippines, Sundaland and mainland southeast Asia (Kalkman & Villanueva, 2011) and *Philosina* with three species found in southern China and northern Vietnam (Yu & Jin, 2024; Zhang et al., 2011). The adults of both families resemble each other in their large size, stocky build and their habit of resting with outstretched wings but differ, among others, in the presence of 11–13 antenodal crossveins in Philogangidae (two in Philosinidae). The nymphs share a general resemblance but clearly differ in the shape of abdominal gills, with those of Philosinidae having thick and undulating lateral gills which, in life, form a tube around the shorter and thinner median gill, while Philogangidae have relatively large gills inflated at the base and gradually tapering to a fine tip (Orr, 2024).

Note 12 The superfamily Megapodagrionoidea **stat. nov.** is established to contain the two families Megapodagrionidae and Argiolestidae. The genera included in both these families were, up to the publications of Kalkman & Theischinger (2013) and Dijkstra et al. (2014), part of Megapodagrionidae together with a large number of other genera currently placed in various other families (see Note 01). Newton et al. (2026) retrieved the Western Hemisphere Megapodagrionidae and the Eastern Hemisphere Argiolestidae as sister groups. The adults of these families do resemble each other, but the nymphs are clearly different. Those of Argiolestidae have flat horizontal gills, while those of Megapodagrionidae are placed in a vertical plane, with the lateral pair triquetral and the median one foliaceus and wider and shorter than the lateral ones (Kalkman et al., 2010).

Note 13 The family Megapodagrionidae (in the strict sense, see Note 01) contains three genera with a total of 29 species all of which are restricted to the tropical and subtropical parts of South America. The genus *Megapodagrion* (one species) is endemic to Amazonia, *Allopodagrion* (three species) occurs in Cerrado and Atlantic Forest domains from southeastern Brazil to northeastern of Argentina, while the species-rich *Teinopodagrion* (25 species) are distributed along the Andes Mountain range from Venezuela to Argentina (Pinto, 2024). De Marmels (2001) published a thorough taxonomic revision of this family.

Note 14 Kalkman & Theischinger (2013) raised Argiolestidae to family level, which recognized and defined two subfamilies based on morphology. Kalkman et al. (2018) published a molecular-based phylogeny and a biogeographical analysis. All genera, except for *Caledopteryx*, are included in the phylogeny presented by Newton et al. (2026).

Note 15 In the past decades the name Calopterygoidea has been used for various combinations of families of damselfly families not included in Lestoidea, Platystictoidea or Coenagrionoidea (Bechly, 1996; Bridges, 1993, 1994; Bybee et al., 2008; Carle et al., 2008; Davies & Tobin, 1984; Dijkstra et al., 2014; Rehn, 2003; Steinmann, 1997a; Silsby, 2001). Several molecular-based phylogenies published in the past two decades showed that Calopterygoidea in the old sense is a paraphyletic group but refrained from defining new superfamilies as support for the relationships between families was lacking (Bybee et al., 2021; Dijkstra et al., 2014). Based on a wide taxon sampling and a wide selection of genes Newton et al. (2026) were able to present a well resolved phylogeny of the families previously included in Calopterygoidea. Based on this, the current paper divides the families formerly belonging to Calopterygoidea into ten superfamilies, resulting in Calopterygoidea *sensu stricto* being restricted to the families Calopterygidae and Chlorocyphidae. These two families differ strongly in the morphology of both the nymphs and adults (although the former share some characters), but the adults of both are colorful, often with elaborate wing-patterns with vibrant iridescence produced by disseminated Bragg reflection (Nixon et al., 2013; Vukusic et al., 2004) and often have elaborate, at least from a human point of view, highly visible, agonistic and courtship behaviour.

Note 16 Several molecular-based phylogenies for Calopterygidae have retrieved the Western Hemisphere genera *Bryoplathanon*, *Hetaerina*, *Mnesarete*, and *Ormenophlebia*, as the sister to all other Calopterygidae (Dumont et al., 2005; Newton et al., 2026). These two groups are regarded as full families in several publications (Dumont et al., 2005, 2007; Karjalainen & Hämäläinen, 2013) but are here regarded as subfamilies of Calopterygidae. Hetaerininae consists of four genera (i.e. mentioned above), largely restricted to the Neotropical region with the exception of few *Hetaerina* species occurring in the Nearctic (Garrison, 1990, 2006). Recent molecular-based phylogenetic and biogeographic analyses by Standring et al. (2022) suggest a need for taxonomic revision as *Ormenophlebia* and *Mnesarete* are retrieved within multiple lineages of *Hetaerina*. Calopteryginae consists of 17 genera, all of which—except the Holarctic *Calopteryx* and the South American *Iridictyon*—are restricted to the Eastern Hemisphere, with the highest diversity found in the Indo-Malayan region. The Calopteryginae have been well-studied genetically by Dumont et al. (2005, 2007, 2010) with later additions from Guan et al. (2012) and after modification proposed by Dijkstra et al. (2014) consists of seven tribes with each one to six genera.

Note 17 The phylogeny presented in Newton et al. (2026) suggests that the family Chlorocyphidae falls into an African and an Asian group. Subfamily names are available but are not being used because one of the available subfamily names predates the family name. The Asian group requires generic revision and several genera will need to be redefined, which may result in changes to generic synonymy.

Note 18 In 2008 both Carle et al. (2008) and Pessacq (2008) showed that the family Protoneuridae consisted of two not closely related groups with the species of the Western Hemisphere falling into Coenagrionidae and the species of the Eastern Hemisphere being part of Platycnemididae. The defining characteristic of this family, reduced longitudinal veins in anal area, was thus believed to be due to convergent evolution. This was supported by phylogeny in Dijkstra et al. (2014) and the Western Hemisphere Protoneuridae were transferred to Coenagrionidae (but see Note 19) while the Eastern Hemisphere genera (*Arabineura*, *Caconeura*, *Disparoneura*, *Elattoneura*, *Esme*, *Melanoneura*, *Nososcticta*, *Phylloneura*, *Prodasineura*) were transferred to the Platycnemididae subfamily Disparoneurinae with later molecular-based phylogenies including Bybee et al. (2021) and Newton et al. (2026) providing additional support for this decision. The six subfamilies of Platycnemiidae are well supported by available molecular-based phylogenies (Bybee et al., 2021; Dijkstra et al., 2014; Newton et al., 2026).

Note 19 The two major changes regarding the delimitation of Coenagrionidae that took place in the past twenty years involve the inclusion of the Western Hemisphere representatives of the former family Protoneuridae (see below and Note 18) and the inclusion of all members of the former family Pseudostigmatidae Tillyard, 1917. For most of the twentieth century, the family Pseudostigmatidae was regarded as one of the most charismatic and seemingly best defined families whose members were confined to the Neotropics (5 genera, 19 species) and Africa (1 genus, 1 species). Their large size, long slender abdomen, often broadened paddle shaped wings, with unique venation and pseudostigma, together with their slow deliberate flight, the habit of gleaning prey from spiderwebs and the use of phytotelmata as nymphal habitat all contributed to the distinctness of this group. However, since 2007, several molecular-based phylogenies have been published showing that the members of this family fall within Coenagrionidae (Bybee et al., 2008; Carle et al., 2008) and that the African species *Coryphagrion grandis* Morton, 1924 is not closely related to the other members of this group; rather it is a result of convergent evolution (Dijkstra et al., 2013; Groeneveld et al., 2007).

The molecular-based phylogeny of Carle et al. (2008) was the first to show that Coenagrionidae can be divided into two main groups, the core Coenagrionidae and the ridge-faced Coenagrionidae, with additional support for this presented by Dijkstra et al. (2014), Bybee et al. (2021), Newton et al. (2026) and Pessacq et al. (2025). Most ridge-faced species have a well-defined ridge (but see Mendoza-Penagos et al., 2025) on the frons and are found in the Australasian, Indomalayan and Neotropical regions. The core-Coenagrionidae lack this well-defined ridge and are in contrast to the ridge-faced coenagrionids also species rich in the temperate regions. Originally the former Western Hemisphere members of Protoneuridae were included in the ridge-faced coenagrionids. Based on both molecular and morphological data, Pessacq et al. (2025) recently proposed to reinstate the familial status of Protoneuridae for a group restricted to the Western Hemisphere genera *Amazoneura, Drepanoneura, Epipleoneura, Epipotoneura, Forcepsioneura, Idioneura, Lamproneura, Neoneura, Peristicta, Phasmoneura, Protoneura, Psaironeura* and *Roppaneura*. While we accept the grouping of Pessacq et al. (2025) and the fact that this group could best be regarded as a separate family, the recognition of Protoneuridae would render Coenagrionidae paraphyletic. For this reason, we retain these genera for the time being within Coenagrionidae. *Leptocnemis cyanops* (Selys, 1869) (endemic to the Seychelles) and Western Hemisphere genus *Argia* (145 species) do not seem to belong in either the core Coenagrionidae, the ridge-faced Coenagrionidae or the Protoneuridae *sensu* Pessacq et al. (2025) and might form additional groups within Coenagrionidae (Newton et al., 2026).

Several further subdivisions have been proposed for Coenagrionidae but these are often poorly defined and do not cover all Coenagrionidae (for review see O'Grady & May, 2003). The molecular-based phylogeny

published as part of the study of Willink et al. (2024) has an extensive taxon coverage and shows several well-defined clades partly corresponding with previously suggested subfamilies or tribes.

Note 20 Dijkstra et al. (2014) considered the genus *Sciotropis* incertae sedis as molecular data (only 16S and 28S) was inconclusive and morphology does not unambiguously allow the genus to be placed in any of the families recognised at that time. Since no new data on the genus has become available and it is absent from the large phylogenies presented by Bybee et al. (2021) and Newton et al. (2026), it is therefore currently the only genus that cannot be placed in a family with any certainty. The genus is composed of two species and is restricted to coastal mountain ranges in Venezuela, where they occur at seepages near rocky streams in dark canyons in cloud forest (De Marmels, 1994).

Note 21 The suborder Anisozygoptera consists of one extant superfamily and family (Epiophlebioidea; Epiophlebiidae) which includes one genus (*Epiophlebia*) with three species. Originally the name Anisozygoptera was established for a group of fossils which are currently believed to be polyphyletic. To solve this issue some authors have suggested combining Anisozygoptera and Anisoptera into Epiprocta or expanding Anisoptera to include *Epiophlebia* (see Dijkstra et al., 2013 for full discussion). Here we retain the use of Anisozygoptera suggesting that the polyphyly of fossil Anisozygoptera should be solved by further subdivision. Studies utilizing both molecular and morphological characters (e.g., Blanke et al., 2013, 2015; Letsch et al., 2016; Kohli et al., 2021) have firmly established the position of extant Anisozygoptera as the sister of Anisoptera. The suborder contains three extant species (Büsse & Ware, 2022): *Epiophlebia superstes* Selys, 1889 which is widespread in Japan, *Epiophlebia laidlawi* Tillyard, 1921 found in the Himalayan (Bhutan, India, Nepal and the Chinese province of Yunnan and Sichuan) and the poorly known *Epiophlebia sinensis* Li & Nel in Li et al. 2012, known from two localities in northeastern China and North Korea (Goodman et al., 2024). Recently the subspecies *E. laidlawi daliensis* Zhang et al. in Yang et al., 2025 was described from Yunnan, China (Yang et al., 2025). The same paper casts doubt on the species status of *Epiophlebia sinensis* through molecular-based phylogenetic evidence, suggesting that it would be conspecific with *E. superstes* and the material on which it was based does not originate from the localities stated in the description.

Note 22 Bybee et al. (2008), Carle et al. (2008), and Davis et al. (2011) previously suggested the superfamily Aeshnoidea, consisting of Austropetaliidae and Aeshnidae. Recent large-scale molecular studies (Bybee et al., 2021; Letsch et al., 2016) as well as Newton et al. (2026) recover Aeshnoidea as monophyletic.

Note 23 All recent molecular studies (Bybee et al., 2008, 2021; Kohli et al., 2021; Letsch et al., 2016; Suvorov et al., 2022) strongly suggest that Aeshnidae are the earliest branching lineage within Anisoptera along with sister family Austropetaliidae. Several subfamilies have been proposed, with some authors using these even at the family level (e.g., Bechly, 1996; Peters & Theischinger, 2007). An extensive phylogenetic morphological study by von Ellenrieder (2002) and molecular-based work by Carle et al. (2015) provided some support for the recognition of Aeshninae, Brachytroninae, and Gomphaeschninae and to a lesser extent Telephlebiinae but the position of some genera remains unclear. A recent molecular study on the Nearctic and Palaearctic representatives of Aeshnidae included a good selection of taxa belonging to Brachytroninae and Aeshninae and found support for these subfamilies based on fragments of the ITS region but conflicting results based on sequences of the COI gene (Schneider et al., 2023).

Note 24 The issue of whether the families Gomphidae and Petaluridae form a clade has prompted considerable debate, and both of them have been placed in separate superfamilies. The recently published phylogeny by Newton et al. (2026) provides strong support that they are indeed each other's sister. Both families share some morphological characters (e.g., adults have the eyes well separated and the male vesica spermalis has ventral protuberances on the first segment), but both also have very distinct features. As there is now clear molecular support for their sister relationship, some additional morphological support, and as there is limited value in having superfamilies with a single family included, we opted to place the families Petaluridae and Gomphidae into the superfamily Gomphoidea.

Note 25 Tolman et al. (2024) presented a well-supported phylogeny of Petaluridae based on 900 loci and including 10 of the 11 species and all genera of Petaluridae. The phylogeny showed that the family dates to 160 Mya and falls into a Gondwanan clade (*Petalura*, *Phenes*, *Uropetala*) and a Laurasian clade (*Tanypteryx*, *Tachopteryx*).

Note 26 The dragonfly family Gomphidae is one of the largest and taxonomically most complex groups within Odonata, comprising approximately 101 genera and 1009 species (Paulson et al., 2025). As the second-largest family within the suborder Anisoptera, gomphids are especially diverse in lotic (running water) habitats and are easily distinguished from other anisopteran in most areas by their widely separated eyes. The monophyly of the family is well supported both by morphological (Rehn, 2003) and molecular data (Bybee et al., 2008, 2021; Dumont et al., 2010; Fleck et al., 2008; Newton et al., 2026), but a well-supported classification at subfamily level is still lacking.

Major contributions to the taxonomy, classification, and phylogeny of Gomphidae based on morphology in-

clude series of papers from Belle including a classification (Belle, 1996 focus on South America), Chao (1984, 1990, both focusing on China) and Carle (1986, analysing global diversity). The latter (Carle, 1986) recognized eight subfamilies: Austrogomphinae, Epigomphinae, Gomphinae, Hageniinae, Lindeniinae (listed as Ictinogomphinae), Octogomphinae, Onychogomphinae and Phyllogomphinae. Many published molecular studies contain some representatives of Gomphidae, but none has an extensive global taxon selection (Bybee et al., 2021; Kohli et al., 2021; Newton et al., 2026; Suvorov et al., 2022). The only two studies that include a wide selection of genera, although still largely limited to a certain area, are focused on Nearctic taxa (Ware et al., 2017) and Western Palearctic taxa (Dumont et al., 2021). Ware et al. (2017) found Lindeniinae as the sister group to all others Gomphidae, and provided support for Onychogomphinae and Gomphinae but did not retrieve Octogomphinae as monophyletic, while the other proposed subfamilies were not included. Dumont et al. (2021) mainly treats representatives of Onychogomphinae and Gomphinae, retrieving these as monophyletic. Although molecular support is available for some of the proposed subfamilies (especially Lindeniinae, Onychogomphinae and Gomphinae) there is only limited or even conflicting support for the other subfamilies. An ongoing molecular revision of the family indicates that the subfamilies defined by Carle (1986) likely form a monophyletic group, following minor adjustments. In addition to molecular data, the study of nymphs is likely to provide additional support for the proposed subfamilies. Several regions (e.g., Belle, 1992 and Novelo-Gutiérrez et al., 2018 for Neotropics; Brochard et al., 2024 for Europe, Suhling et al., 2014 for Namibia, Novelo-Guittierez & Sites, 2024 for Thailand) have overviews of the nymphal stages available, but this information has not been collated for several high diversity areas such as China.

Note 27 The superfamily Cordulegastroidea contains the three families Chlorogomphidae, Neopetaliidae and Cordulegastridae. The monophyly of this superfamily and the families therein is supported by several molecular studies including Bybee et al. (2021), Carle et al. (2015), Letsch et al. (2016) and Newton et al. (2026). Davies (1981) recognized Neopetaliidae as a family and, in addition to *Neopetalia,* also included *Archipetalia* (Tasmania), *Austropetalia* (Southeast Australia), *Phyllopetalia* and *Hypopetalia* (Patagonia). Carle & Louton (1994) and Carle (1995) subsequently placed all but *Neopetalia* in Austropetaliidae, hence *Neopetalia punctata* (Hagen *in* Selys, 1854) from Chile and southwestern Argentina is the sole remaining member of Neopetaliidae.

The family Chlorogomphidae contains over fifty species of which a few occur on Sundaland and the Philippines but the greatest diversity is found in the mountainous regions of Indochina and China. Members of the family were historically regarded as a subfamily within Cordulegastridae (Davies, 1981) but were promoted to family status and moved to superfamily Libelluloidea by Carle (1995), for which Dumont et al. (2010) and Letsch et al. (2009) provided molecular support. Fleck (2011) included Cordulegastridae and Neopetaliidae in Cordulegastroidea, leaving the position of Chlorogomphidae undecided, but suggested that they might be the sister group to Cordulegastridae + Neopetaliidae, an arrangement subsequently adopted by Dijkstra et al. (2013). Schneider et al. (2025) recently confirmed the monophyly of the family based on an analysis of sequences of ITS, H3-H4 and COI. They also showed that the genera *Chloropetalia* and *Watanabeopetalia* fall within the genus *Chlorogomphus.* The family Cordulegastridae has a Holarctic distribution with two genera and 11 species found in the Nearctic and four genera (one shared with the Nearctic) and 38 species in the Palaearctic spilling over into the Indo-Malayan region in the Himalayas and southern China. Lohmann (1992, 1993) published a morphological revision of the family. Schneider et al. (2024) recently published a historical overview of the family. Morphological differences between species and genera are often limited, patterns of coloration often show regional variation and numerous species are only known from a small amount of material. As a result, numerous generic names were historically proposed, many of which are now treated as junior synonyms (*Archegaster*, *Kalyptogaster*, *Kuldanagaster*, *Lauragaster*, and *Pangaeagaster*). The revisions of Froufe et al. (2014), Schneider et al. (2021) and Schneider et al. (2022) resolved much of the confusion regarding species delimitation for the species occurring in the Western Palaearctic. The familial revision by Schneider et al. (2024) resulted in the reinstatement of the genera *Thecagaster* and *Zoraena*. Remaining issues mainly refer to the position of Nearctic species of *Cordulegaster*, the definition of *Neallogaster* and the species delimitation within *Anotogaster*. Many species of the latter genus are poorly known, with Zhang (2019), for example, depicting eight undescribed species.

Note 28 The superfamily Libelluloidea has 1477 species, 195 genera and 13 families and is by far the largest superfamily within Anisoptera. The families Macromiidae and Libellulidae have remained largely unchanged and undisputed since Macromiidae was split off from Corduliidae (Gloyd, 1959). In addition, the core of Corduliidae, which is formed by the genera also currently placed in Corduliidae, remained intact. All other genera, however, were either included in Corduliidae, were combined with Synthemistidae or were divided over a wide variety of other families. As a result most of these genera were listed for a variety of families in the past twenty years (Carle et al., 2015; see Table 1 in Ware et al., 2007). Goodman et al. (2026) provide an extensive overview of the history of the classification of these genera. This familial instability was hopefully mostly resolved by the revision of Synthemistidae and Corduliidae by Goodman et al. (2026), in which the split of Corduliidae into Corduliidae and the recently

erected family Aeschnosomatidae was corroborated, and Synthemistidae s.l. was divided into nine families (Gomphomacromiidae, Pseudocorduliidae, Synthemistidae s.s., Austrocorduliidae, Idomacromiidae, Idionychidae, Lauromacromiidae, Macromidiidae and Neophyidae). This revision was based on an extensive dataset of both molecular and morphological data, the latter which also provided a means to attribute several genera, for which no molecular data was available until recently, to a family (*Archaeophya*, *Libellulosoma*, *Austrophya*, *Apocordulia*, and *Cordulisantosia*).

Note 29 The small families Pseudocorduliidae and Gomphomacromiidae form together, with Synthemistidae, the first diverging clade of Libelluloidea. Pseudocorduliidae contains two species both restricted to small areas of tropical northeast Queensland (Endersby, 2021) making it the family with the smallest range of all Anisoptera. Both the adults and nymphs of the two species belonging to this family can be identified with Theischinger & Endersby (2009). Gomphomacromiidae contains only two genera, *Gomphomacromia* (five species), found in South America along Andean Mountain Chain, and *Archaeophya* (two species) found in eastern Australia. The adults and nymphs of the latter can be identified with Theischinger & Endersby (2009) and Theischinger et al. (2021). Von Ellenrieder & Garrison (2005) revised *Gomphomacromia* relatively recently. One additional species (*G. signata* Tennessen, 2024) has been described since, and at least one new species is waiting to be described.

Note 30 The name Synthemistidae *sensu lato* has widely been used for all Libelluloidea with the exclusion of Corduliidae, Libellulidae and Macromiidae or in the strict sense, as it is defined in the present classification. This means that all current members of Pseudocorduliidae, Gomphomacromiidae, Austrocorduliidae, Idionychidae, Macromiidae, Idomacromiidae, Lauromacromiidae, Macromidiidae and Neophyidae have at times been listed as Synthemistidae. The family, as presently defined, is restricted to the Australasian region.

Note 31 Austrocorduliidae and the genera therein have a complex history and several other genera currently placed in other families were at times included in this family. The present definition is largely similar to that in use in Australian literature (Theischinger & Endersby, 2009; Theischinger et al., 2021), with the exception that the genus *Cordulephya* is included as well (listed in the now unrecognized family-group name Cordulephyidae in Theischinger & Endersby (2009)). The family includes seven small genera (1 to 4 species), all restricted to Australia (Endersby, 2021). Not only are all included genera small, but they are also poorly known with many species rarely being observed and information on their biology generally lacking. Identification of adults and nymphs is possible with Theischinger & Endersby (2009) and Theischinger et al. (2021).

Note 32 Fleck (2026) presents data on taxonomy and phylogeny of Oxygastridae Bechly, 1996 *sensu* Fleck, 2018 which seems to be a response to Goodman et al. (2026) although that paper is not cited. In Fleck (2026) four new tribes and five new subfamilies are proposed. As the current paper does not attempt to resolve tribes, we refrain from expressing an opinion on these. Fleck (2026) uses Oxygastridae *sensu* Fleck for the genera *Austrophya*, *Juliecordulia*, *Lathrocordulia*, *Macromidia*, *Mesocordulia*, *Micromidia*, *Neocordulia*, *Oxygastra*, *Presba*, *Siriusocordulia*, *Syncordulia*, and *Theischingerophya*. In Goodman et al. (2026) the genus *Oxygastra*, the type genus of Oxygastridae Bechly, 1996, is included in Idomacromiidae Tillyard & Fraser, 1940, a family group name that takes precedence as it is older. However in his intuitive phylogenetic tree, Fleck (2026) places *Idomacromia*, the type genus of Idomacromiidae, outside this group of genera in which case Oxygastridae would be the correct name. However, this is in clear conflict with the phylogenomic data presented by Goodman et al. (2026), in which *Idomacromia proavita* (type species) is retrieved among the genera making up Oxygastridae *sensu* Fleck and therefore the name Idomacromiidae is used in the current classification.

The genera included in the five subfamilies proposed by Fleck (2026) for Oxygastridae *sensu* Fleck fall into three different families in Goodman et al. (2026). Based on molecular data these proposed subfamilies, when combined, are not monophyletic and molecular support for Oxygastridae *sensu* Fleck is lacking.

The subfamily Macromidiinae as proposed by Fleck (2026) consists of the single genus *Macromidia* and completely overlaps with the family Macromidiidae Goodman et al. (2026). The proposed subfamilies Oxygastrinae (for *Juliecordulia*, *Oxygastra*, *Neocordulia*, *Mesocordulia*) and Syncorduliinae (for *Siriusocordulia*, *Syncordulia*, *Presba*) fall in the family Idomacromiidae as defined by Goodman et al. (2026) (but excluding *Idomacromia* and *Nesocordulia*). The taxa included in the subfamily Syncorduliinae are not retrieved as monophyletic based on the phylogenomic inference presented by Goodman et al. (2026). Molecular data of Goodman et al. (2026) show that the genera included in the proposed Oxygastrinae form a monophyletic group but with *Idomacromia proavita* included. However, the inclusion of the latter would mean this would need to be referred to as Idomacromiinae. Due to the possible non-monophyly of Syncorduliinae and the issue with the unsupported exclusion of *Idomacromia* we presently refrain from recognising subfamilies within Idomacromiidae.

The proposed subfamilies Micromidiinae (for *Micromidia*) and Austrophyinae (for *Lathrocordulia*, *Austrophya*, *Theischingerophya*) fall into the Austrocorduliidae (but excluding *Apocordulia*, *Austrocordulia*, *Hesperocordulia*, *Cordulephya*). The proposed subfamilies clearly conflict with the well-supported molecular based and the total evidence-based phylogenetic trees (molecular and morphological data) as presented in Goodman et

al. (2026) and further data is needed before subdividing the family Austrocorduliidae.

Note 33 Idionychidae is sister to Macromiidae and consists of a single genus *Idionyx* whose 29 described species are found throughout most of the Indomalyan region, with some species reaching the Philippines and the Lesser Sundas. The species superficially resemble species of *Macromidia* with which they broadly overlap in range, but were not found to be each other's closest relatives, with the latter being placed in the family Macromidiidae (Goodman et al., 2026).

Note 34 The genera currently placed in Macromiidae were up to the publication of Gloyd (1959) part of Corduliidae, but it was not until the publication of May (1997) that this family status was widely accepted. Goodman et al. (2026), Newton et al. (2026) and Kosterin et al. (2025) provide molecular support for the monophyly of Macromiidae. The latter also showed that the North American genus *Didymops* falls within *Macromia* and should hence be regarded as a synonym. The family comprises *Epophthalmia* (Southeast Asia, 5 species), *Phyllomacromia* (Afrotropics, 36 species) and *Macromia*. The 84 members of the latter genus are predominantly found from northern Australia to the tropical parts of southeast Asia, with an additional eight species in the Palaearctic and seven in the Nearctic. The genus *Macromidia* is not particularly close to Macromiidae and is placed in its own family, with the confusingly similar looking and sounding name, Macromidiidae.

Note 35 Idomacromiidae consist of one South and Central American genus (*Neocordulia*, 17 species) and four genera found on Madagascar (*Nesocordulia*), West and Central Africa (*Idomacromia*), Cape region (*Syncordulia*) and southwest Europe and northwest Africa (*Oxygastra*) - a distribution that suggest a Gondwanan origin. As is the case with many of the genera currently belonging to the smaller libelluloid families, the history of classification is complicated. In the past decades members of the current family have been placed in Corduliidae s.l., Synthemistidae s.l., Austrocorduliidae and Oxygastridae (Bechly, 1996; Lohmann, 1996). Previous molecular-based phylogenies failed to produce a well-supported topology for these genera due to a more limited sampling of taxa and genes (Carle et al., 2015; Letsch et al., 2016; Ware et al., 2007). In the phylogeny of Goodman et al. (2026), the five genera represent a well-supported monophyletic group which led to the updated definition of the Idomacromiidae. The genera included have relatively small and non-overlapping ranges, and apart from *Oxygastra*, are relatively rarely observed, with data on behaviour being scarce. All genera have descriptions of nymphs: *Idomacromia* (1 of the 3 species described); *Neocordulia* (7 of the 17 species), *Nesocordulia* (1 of the 12 species), *Syncordulia* (1 of the 4 species) and *Oxygastra* (Barnard, 1937; Fleck & Legrand, 2006; Legrand, 1996; Novelo-Gutierrez & Ramírez, 1995). *Nesocordulia* was recently reviewed (Bernard et al., 2025) doubling its number of species.

Note 36 The South American genus *Lauromacromia* has, in recent decades, been placed in both Austrocorduliidae and Gomphomacromiidae (Carle, 1995; Davies & Tobin, 1985; Lohmann, 1996; Steinmann, 1997b). Based on extensive molecular data, Goodman et al. (2026) showed that the genus is nested outside both Austrocorduliidae and Gomphomacromiidae, and accordingly established a new family, Lauromacromiidae, for the single genus *Lauromacromia* (six species). The publication of Goodman et al. (2026) was first made available online on October 9, 2025, with the work and nomenclatural acts registered in ZooBank, thereby rendering the family-group name available under the Zoological Code. Subsequently, Fleck et al. (2025) independently proposed the family Lauromacromiidae; however, their work was published later (October 30, 2025). Accordingly, authorship of Lauromacromiidae is attributable to Goodman et al. (2026) under the Principle of Priority (ICZN Article 23.1). Despite being relatively widespread, both observations and specimens of the genus are very rare (Ehlert & Pinto, 2020; Pinto & Carvalho, 2010). Information on the genus and its morphology can be found in Ehlert & Pinto (2020), Goodman et al. (2026) and Pinto & Carvalho (2010), and description of nymphs can be found in Fleck (2002, 2008) and Carvalho et al. (2008). Pinto & Carvalho (2010) provided a morphological-based phylogenetic analysis that recognized three lineages in the family associated to Amazonia, Cerrado (Brazilian Savannah) and Atlantic Forest Domains, a hypothesis that is pending higher taxon sampling and inclusion of molecular data to be corroborated.

Note 37 Macromidiidae with its single genus *Macromidia* is found in tropical and subtropical parts of southeast Asia reaching north into central China, having a range that largely overlaps with that of *Idionyx*, which is currently the only genus in the family Idionychidae. Based on morphology, *Macromidia* has variously been placed in Corduliidae, Macromiidae and Idionychidae. Phylogenetic studies failed to retrieve the *Macromidia* and *Idionyx* as sister genera (Carle et al., 2015; Letsch et al., 2016; Ware et al., 2007) and the more extensive molecular-based phylogeny of Goodman et al. (2026) showed that *Macromidia* is best placed in its own family. Fleck et al. (2026) also described Macromidiidae, but Goodman et al. (2026) has priority under ICZN Article 23.1 due to earlier online publication. The genus and its ten species has no key, and differences between species are often small, which has led to the description of many taxa currently considered to be synonyms. Descriptions exist for the nymphs of three species: *M. rapida* Martin, 1907 and *M. genialis* Laidlaw, 1923 (Needham & Gyger, 1937; Novelo-Gutiérrez & Sites, 2024) and that of *Macromidia fulva* Laidlaw, 1915 as *Onychothemis coccinea* Lieftinck, 1953 (Orr, 2001).

Note 38 Neophyidae is a monotypic family represented by just a single species. *Neophya rutherfordi* Selys, 1881 is found at streams in rainforest in West and Central Africa. Two fossils, *Palaeophya argentina* Petrulevicius & Nel, 2009 (South America) and *Neophya legrandi* Nel & Fleck, 2013 (Europe), are attributed to Neophyidae (Goodman et al., 2026). This suggests that the family, like several other smaller families in Libelluloidea, has had a far wider distribution and was probably much more diverse in the past.

Note 39 Corduliidae is, after Libellulidae, the second largest family of the Libelluloidea. Until recently many of the genera currently placed in Aeschnosomatidae, Austrocorduliidae, Gomphomacromiidae, Idionychidae, Idomacromiidae, Lauromacromiidae, Macromidiidae, Neophyidae, Pseudocorduliidae and Synthemistidae were regarded part of Corduliidae s.l. The molecular based revision by Goodman et al. (2026) shows the 18 genera of Corduliidae to form a largely pectinate phylogeny, not allowing for the definition of meaningful subfamilies. Goodman et al. (2026) also showed that *Procordulia* should be merged with *Hemicordulia*. The family is relatively well studied with recent molecular studies available for the genera *Somatochlora* and *Neurocordulia* (Goodman et al., 2026; Ware et al., 2025a). The revision of *Somatochlora* gave support for recognising *Corduliochlora* as a genus distinct from *Somatochlora,* as previously proposed by Marinov and Seidenbusch (2007). The highest species level diversity is found in the Holarctic region (mostly *Cordulia*, *Epitheca*, *Neurocordulia*, *Somatochlora*) and in Australasia and Wallacea (*Hemicordulia*). Morphological analysis by Goodman et al. (2026) recovered *Cordulisantosia,* a endemic genus of the Brazilian Atlantic Forest, with high support within Corduliidae, but its exact placement among the various clades of Corduliidae is still unclear, highlighting the importance of further molecular studies on this family.

Note 40 The four genera (*Aeschnosoma*, *Pentathemis*, *Schizocordulia* and *Libellulosoma*) belonging to Aeschnosomatidae were until recently included in Corduliidae. Over the past hundred years, several authors discussed the possibility of a close relationship between *Aeshnosoma* and *Pentathemis*—at first mainly based on shared venational characters—but in the past two decades focussing on the shared characters of the nymphs, mainly the very long lateral spines on abdominal segments 8 and 9 (Fleck, 2012a,b; Fleck & Legrand, 2013; Fleck & Neiss, 2012; Theischinger & Endersby, 2014). Based on morphological similarity Fleck et al. (2020) formally established the subfamily Aeschnosominae. Bybee et al. (2021), Letsch et al. (2016), Ware et al. (2007) and Newton et al. (2026) have already provided molecular support of a close relationship between *Aeschnosoma* and *Pentathemis*. Goodman et al. (2026) showed, based on molecular data, that *Aeschnosoma, Schizocordulia* and *Pentathemis* are closely related and nested outside Corduliidae, being closely related to, but distinct from, Libellulidae. Unaware of the establishment of Aeschnosominae by Fleck et al. (2020), Goodman et al. (2026) erected the family Aeshnosomatidae including *Aeschnosoma, Schizocordulia* and *Pentathemis* based on molecular data and adding *Libellulosoma* based on morphological data.

The establishment of the family-group name Aeschnosominae in Fleck et al. (2020) is nomenclaturally valid. However, as the type-genus, *Aeschnosoma* ends in the Greek noun *-soma* (stem *-somat*, from *-somatos*), Article 29.3.1 of the ICZN applies, and thus the correct family-group name is Aeschnosomatidae. The establishment of the family-group name Aeschnosominae by Fleck et al. (2020) predates the establishment of Aeshnosomatidae by Goodman et al. (2026) so that the correct name and authorship of the family is: Aeschnosomatidae Fleck in Fleck, De Marmels & Theischinger (2020).

The family has a remarkable distribution with *Aeschnosoma* and *Schizocordulida* found in South America, and *Pentathemis* in Australia and *Libellulosoma* in Madagascar. This pattern suggests a Gondwana relict distribution, with the family more widespread and probably more diverse in the past.

Note 41 While the monophyly of the family is undisputed, the division of Libellulidae into subfamilies has proven problematic. Based on morphology, Bridges (1994) and Davies and Tobin (1985) proposed eleven subfamilies, which largely mirror groups of the Tillyard and Fraser system (Fraser & Tillyard, 1957). These subfamily names were used in the Sanger based phylogeny published by Carle et al. (2015) but in many cases with a different combination of genera. Subsequent studies, including those using genomic data, only provided clear support for the monophyly of Libellulinae, Urothemistinae and Tetrathemistinae (e.g., Bybee et al., 2021; Kohli et al., 2021; Newton et al., 2026; Suvorov et al., 2022) but with limited taxon sampling in these groups and in general showed low branch support along the backbone of the family. This in contrast to much higher support values found in other families. These low support values and short internodes along the backbone of Libellulidae are likely the result of rapid radiations over a relatively short period of time making the nodes more difficult to resolve (see Letsch, 2007; Pilgrim & von Dohlen, 2008; Ware et al., 2007 for further discussion). Although a combination of molecular data and morphology allows to place most genera in subfamilies (see Dijkstra, 2025 for a general overview) clear molecular support is lacking.

Discussion

Progress made in 21st century

Over the past twenty years we have made tremendous progress in odonate phylogeny. Twenty of the 28

families recognised at the start of this century such as Lestidae, Platystictidae, Gomphidae, Aeshnidae and Libellulidae have changed relatively little regarding their composition. Two other large families, Platycnemididae and Coenagrionidae, are also still recognised but their composition has markedly changed due to the inclusion of the former families Pseudostigmatidae and part of Protoneuridae into Coenagrionidae and several genera being moved from Coenagrionidae to Platycnemididae or vice versa (see Dijkstra et al., 2013, 2014). The great majority of changes that have taken place in odonate phylogeny over the past twenty years involved just three families: Amphipterygidae, Megapodagrionidae and Corduliidae, that have been broken into respectively, four, 16 and nine families. Even prior to the use of molecular techniques, the monophyly of Megapodagrionidae and Corduliidae (as defined at the time) faced significant doubt. Kalkman et al. (2010) tentatively split Megapodagrionidae in meaningful groups based on nymphal morphology. For Corduliidae, adult morphology helped establish several additional families. It is however unlikely that the present phylogenetic comprehensive hypothesis could have been inferred based on morphological data alone, and with subjective evidence and homoplasies open to multiple interpretations it would be much more difficult to reach a consensus among odonatologists.

Diversity and distribution

The order Odonata (dragonflies and damselflies) is divided into three suborders, 17 superfamilies, 55 families and 687 genera. One of these suborders, Anisozygoptera, is small, consisting of one family with one genus and only three species. The other two suborders have about equal numbers of species with Anisoptera or true dragonflies having 20 families, 368 genera and 3112 species and Zygoptera or damselflies having 34 families, 318 genera and 3332 species. The average number of species per genus is nine but varies widely between families (Table 2), with several families having twice this average: Platystictidae (28 on average), Heteragrionidae (19), Philogeniidae (23), Chlorogomphidae (19), Idionychidae (29) and Macromiidae (42). Four genera have over a hundred species: *Gynacantha* (101 species), *Drepanosticta* (127), *Argia* (145) and *Pseudagrion* (165), however, further work will likely split *Drepanosticta* and *Pseudagrion* into multiple genera. Table 2 summarizes the number of families, genera and species for each superfamily and gives their presence in the nine biogeographical regions. Only four of the 17 superfamilies are represented in all nine biogeographical regions (Lestoidea, Coenagrionoidea, Aeshnoidea, Libelluloidea) with Calopterygoidea and Gomphoidea found in all regions except Oceania. Six superfamilies are only found in one or two regions, two of which (Priscagrionoidea and Polythoroidea) are only found in one region. The restricted distribution of the superfamily Polythoroidea is especially interesting as this is with seven families after Libelluloidea the most family richest superfamily. While the highest diversity in number of species and families is found in the Neotropical, Australasian and Indo-Malayan regions it is the latter which clearly has the highest diversity at superfamily level which is mainly caused by four of the six superfamilies only found in one or two regions occurring in the Indo-Malayan region. Surprisingly Wallacea has the same number (nine) of superfamilies as the Afrotropical and Australasian region despite being much smaller and consisting of islands which were never connected

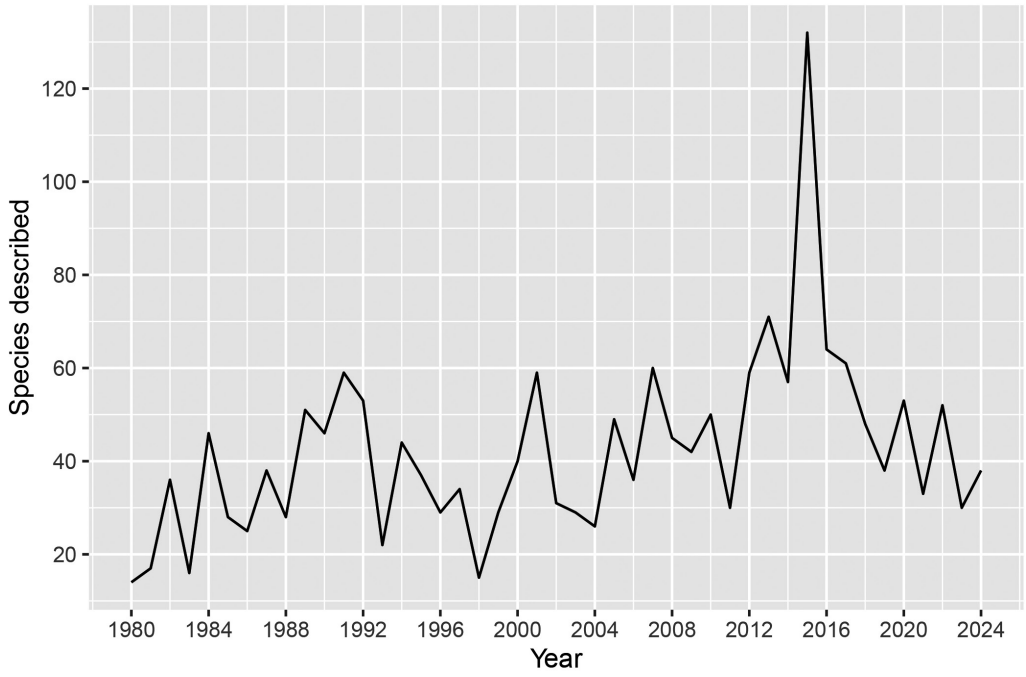

Figure 2. Number of annually described species from 1980 onwards.

to the mainland of continents. This relatively high diversity of superfamilies is caused by some superfamilies just reaching the Philippines, albeit with a very small number of species. Although the abundance of superfamilies gives some indication of phylogenetic diversity it is of course influenced by partly arbitrary practical choices in definition of superfamilies.

Figure 2 shows the annual number of species described since 1980. The peak in 2015 is due to a paper in which 61 species were introduced from Africa (Dijkstra et al., 2015). From Figure 2 it is clear that the number of species described is not leveling off and the number of described species since the start of this century is even higher than in the last twenty years of the 20th century. Kalkman et al. (2008) estimated the number of described species at 5680 and the total number of still undescribed species to be between 1085 and 1425. Nearly all species occurring in the temperate regions of the Palearctic and Nearctic are expected to have been described although surprises such as the discovery of a new species of *Onychogomphus* in Spain still occur (López-Estrada et al., 2020). The Neotropical, Indomalayan and Australasian regions, however, are expected to be home to hundreds of undescribed species. At present the count for described species stands at 6447, with an estimated number of species to be found and described of at least 1000 more. Based on this, our current estimate of extant species is between 7500 and 8000. With an undiminished rate of description, averaging 50 species per year in the 21st century, an estimated 95% of all species will be described by 2040.

Towards a stable classification

With the work done in the past decade the classification of Odonata seems to be close to taking its final shape. Support for most of the branches is high, and it seems unlikely further analyses or additional data will make significant changes. This said, we acknowledge that gene trees are in many cases divergent from species trees, and a better understanding of causes of these differences might result in adjustments to the classification. The placement of *Sciotropis*, a genus only known from two species from Venezuela, is still unknown as it was not included in recent phylogenies presented by Bybee et al. (2021) and Newton et al. (2026). It is not impossible that it is nested outside the currently recognised families and would necessitate the erection of an additional family. Further work on morphology might result in new characters supporting the currently recognised genera, but it is unlikely to result in major adjustments in the classification on family-level and higher taxa. The nymphs of Amanipodagrionidae are still unknown and it is likely that their description would provide additional support for this small family. Many families have names available at the subfamily and tribe level, although molecular-supported consensus about these is yet to be reached. Most noteworthy in this respect are Lestidae, Coenagrionidae, Aeshnidae, Gomphidae and Libellulidae. For all these families, molecular revisions are in the works and well supported subfamilies are likely to be established in the near future.

This paper focuses on the classification of extant odonates. There is also a large body of publications on fossil odonates and given that odonates date back to over 300 million years ago, it is no surprise that these publications show a large diversity of extinct lineages (Nel & Piney, 2022). Many researchers either focus on fossils or on extant odonates, with only a few with comprehensive knowledge of both. The progress made on the classification of extant odonates in the past two decades is largely due to molecular data with some support from the morphology, mainly that of nymphs and the secondary genitalia of adult males. These characters are not available for fossil specimens. Recent insights based on molecular data have shown that venation, the main source of information for fossils, is often very informative, but it can also be misleading, with emphasis on venation having led to incorrect assumptions on relationships at the genus and family level. Add to that the relative scarcity of fossils, with many taxa only known from single, often poorly preserved specimens, and one can understand the difficulty of building a phylogeny for fossil odonates and the challenges of combining data across extant and extinct forms. With the classification of extant odonates probably becoming resolved in the next few years, the next endeavor for odonate classification will be reconciling and as far as possible integrating our knowledge of extant and fossil odonates.

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